

# **Dixie National Forest**

## **Land and Resource Management Plan**

### **Fiscal Year 2011 Monitoring and Evaluation Report**

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**USDA, Forest Service, Region 4**

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## EXECUTIVE SUMMARY

This report presents a synopsis of monitoring results based on reports from Dixie National Forest. The function of this report is to prompt managers to take a closer look at some of the monitoring items for possible amendments and/or consideration in Forest Plan revision, and provide information to the public who are interested in management on the Dixie National Forest.

Of the monitoring items identified in the Forest Plan and amendments, 57 (67%) have been accomplished sufficiently to report results. Of the items monitored with results, 21 (25%) indicate a variation causing further evaluation and/or change in management direction.

A Forest Plan amendment is recommended for 35 monitoring items. Thirteen monitoring items are recommended for dropping or combining, thirteen for rewording, and fifteen to change the monitoring method. The remaining items recommended for Forest Plan amendment involve more complex changes.

Recommendations based on these results are:

- 1) Conduct further evaluation of those items that exceed the stated variation and may indicate a need for change in management direction;
- 2) Use this document as need for change to the Forest Plan with amendment(s) where appropriate;
- 3) Review priorities previously identified for these monitoring items to establish priorities for future monitoring;
- 4) Review annual monitoring report requirements and frequency for appropriateness.



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# SECTION 1.INTRODUCTION

## A. Background

The Record of Decision on the Environmental Impact Statement for the Dixie National Forest Land and Resource Management Plan (Forest Plan) was signed in September of 1986. The Forest Plan provides broad direction for managing resources to attain desired conditions. The Forest Plan is implemented by projects planned and implemented at smaller, more site-specific scales to move existing conditions toward the desired conditions. Implementation activities are generally identified by goals and objectives and guided by standards and guidelines.

Regulations<sup>1</sup> require monitoring in order to determine whether or not our actions are moving toward desired conditions and are being implemented within Forest Plan standards and guidelines. This is accomplished on a basis outlined in the Forest Plan (pages V-1 to V-13). Monitoring results may demonstrate needed changes in management direction<sup>2</sup>, goals, objectives, standards and guidelines, and/or monitoring methods. These changes generally require a Forest Plan amendment. Forest-wide and site-specific monitoring elements are listed in the Forest Plan on pages IV-4 to IV-12.

Many Forest Service personnel have conducted monitoring efforts over the past year. Persons compiling and evaluating the data in this report are as follows:

Developed Recreation and Scenic Resources	Rick Dustin
Dispersed Recreation and Wilderness	Nick Glidden
Wildlife	Jenna Jorgensen and Ron Rodriguez
Fisheries	Mike Golden
Range	Mark Madsen and Chad Horman
Timber	Jim Gerleman
Soils and Water	Rich Jaros
Air Quality	Linda Chappell and Kevin Greenhalgh
Minerals	Sue Baughman
Lands	Kathy Slack
Facilities	Paul Dastrup, Jake Dodds, and Steve O'Neil
Protection – Fire	Linda Chappell and Kevin Greenhalgh
Protection – Insects and Diseases	Jim Gerleman
Economics	Kenton Call

## B. Format

This report is organized corresponding to monitoring items listed in the Forest Plan, Chapter V, pages IV-1 to IV-13 plus Forest Plan amendments by resource. Each monitoring item is divided into six parts, which are described below:

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<sup>1</sup> Title 36 Code of Federal Regulations 219.11 (d).

<sup>2</sup> Title 36 CFR 219.12 (k).

Methods. This includes the methods prescribed in the Forest Plan and may include specifics regarding the item monitored. Where applicable, other methods used are also discussed. Accounting codes refer to budgeting for internal reference and use.

Variation. For each monitoring item, the Forest Plan describes “Variation which would cause further evaluation and/or change in management direction.” This is described in this report as “Variation.” Where Forest Plan direction or goals are referenced, the page number and brief description is included. The extent to which further evaluation is needed and if further actions are warranted is not determined in this report.

Results. A summary of results from specialist reports is provided. More detailed information can be obtained from these reports.

Interpretation. The results are compared to the variation that may cause further evaluation and/or a change in management direction: “Are variations exceeded?” The monitoring results are described regarding what it means to the resource or the Forest Plan: “What are the implications?” “Conclusions” describe the consequences to the resources indicated by the results and implications.

Monitoring Resources Available. The availability of funding and/or labor to accomplish the monitoring is presented.

Recommendation. This section answers questions such as, “Should we continue to monitor?” and, “Is the monitoring identified in the Forest Plan still appropriate?” The recommendations identify items needing further analysis and do not suggest solutions. Solutions will be determined with the further analysis triggered by the variation.

Goals and objectives are identified in Section 20 with a brief statement whether or not they have been attained. Reasons for non-attainment are not included. If part of a goal was attained and another part not attained, it was counted as not attained overall in this report.

The last section of this document summarizes the results and recommendations regarding monitoring priorities, items where a variation is causing a further evaluation and/or change in management direction, and if a Forest Plan amendment is recommended. Results of Forest Plan objective attainment are also included.

## SECTION 2.DEVELOPED RECREATION – PUBLIC

### A. Condition of Facilities

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Condition of Facilities (whether the condition of developed facilities is declining from the current situation).	Annual RIM Reports - Total \$ needed to bring facilities to Condition Class 1; Measure bi-annually; Five-year reporting frequency.	H/M	Five year average exceeds 1985 by 5%

#### Methods.

No data collected in fiscal year 2011.

#### Variation.

Objective (b) in the Forest Plan relating to Developed Recreation Facilities is to bring the condition of the facilities to Condition Classes 1 or 2 by the year 2000 (page IV-1; Classes range from 1-5, with 5 being primitive and 1 most developed, with hardened sites, flush toilets, etc.). In addition, recreation facility water and sewage systems were to meet State standards by the year 2000 (page IV-1). The objective of this measure is to determine whether the conditions of developed facilities have improved or are declining from the 1986 condition.

#### Results.

No results in fiscal year 2011.

#### Interpretation.

**Is further evaluation needed?** Unknown. Data is not sufficient to determine.

**What are the implications?** Conditions of facilities are degrading at an unknown pace.

**Conclusion.** More data analysis is needed to determine condition of facilities.

#### Monitoring Resources Available.

No monitoring information available.

#### Recommendation.

Renew monitoring efforts on condition of facilities. Consider changing wording and change the method of measure and/or monitoring frequency.

## B. Soil and Vegetation Loss

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and Vegetative Loss at Developed Sites.	Transects, photo points at selected key sites; monitoring and reporting every five years.	H/M	Campsite condition below Class III using the Limits of Acceptable Impact.

### Methods.

No data collected in fiscal year 2011.

### Variation.

The variation causing further evaluation for this measure in the Forest Plan is when campsite conditions fall below Class III using the Limits of Acceptable Impact. "Limits of Acceptable Impact" is a process to identify thresholds of acceptable impacts from use. In developed sites, it refers to the threshold or limit of conditions where the public would no longer visit the site because of deteriorated or undesirable conditions.

Forest Plan direction is to develop and implement a vegetative prescription for each developed site (page IV-2).

### Results.

No results in fiscal year 2011.

### Interpretation.

**Is further evaluation needed?** Unknown. Data is not sufficient to determine.

**What are the implications?** Soil and vegetation loss at developed sites is degrading at an unknown pace.

**Conclusion.** More data analysis is needed to determine soil and vegetation loss at developed sites.

### Monitoring Resources Available.

No monitoring information available.

### Recommendation.

Renew monitoring efforts on soil and vegetation loss at developed sites. Consider changing wording and change the method of measure and/or monitoring frequency.

## C. Facility Capacity and Developed Site Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Facility Capacity (whether construction and reconstruction of facilities is keeping pace with demand)	Annual PAOT, PAOT-Days, with five-year reporting frequency.	H/H	PAOT and PAOT-Days greater than or equal to 90% of projected demand.
Developed site use – Amount and distribution (does demand exceed supply?)	Annual double sample indicator sites, random sample all fee sites, with annual reporting frequency.	M/M	Use of an individual site exceeds 60% of theoretical capacity for the summer season or daily use exceeds capacity on more than 5% of the days in the summer season. The five-year average developed site use for the Forest varies from projected demand by more than 20%.

### Methods.

No data collected in fiscal year 2011.

### Variation.

Forest Plan Objective (a.) under Goal No. 1 is: Program to add facilities with a capacity of 875 PAOT to the current 5895 PAOT by 2020.

Forest Plan Direction for this goal is:

“Develop the following new sites to accommodate increased use:

1985-1995	Deer Creek - 250 PAOT
1995-2005	Blue Springs Point - 250 PAOT
2005-2015	Pine Valley - 250 PAOT
2015-2025	Fish Creek Lake - 125 PAOT

Rehabilitate and define the following sites to accommodate increased use:

1985-1995	Spruces - 160 PAOT, Cedar Canyon - 95 PAOT
1995-2005	Duck Creek - 395 PAOT
2005-2015	Juniper Park - 110 PAOT, Blue Springs - 100 PAOT
2015-2025	Kings Creek - 225 PAOT
2025-2035	Te-Ah - 210 PAOT”

Measuring these objectives will determine whether construction and reconstruction of facilities is keeping pace with demand. In order to determine demand, facility use data are needed. Therefore, this monitoring item and Developed Site Use monitoring are addressed together.

The variation causing further evaluation for visitor use is when use of an individual site exceeds 60% of theoretical capacity for the summer season, or daily use exceeds capacity on more than 5% of the days in the summer season. Also, the five-year average developed site use for the Forest varies from projected demand by more than 20%.

#### **Results.**

No results in fiscal year 2011.

#### **Interpretation.**

**Is further evaluation needed?** Unknown. Data is not sufficient to determine.

**What are the implications?** Facility capacity and developed site use need is not being met.

**Conclusion.** Data is needed to determine facility capacity and developed site use.

#### **Monitoring Resources Available.**

No monitoring information available.

#### **Recommendation.**

Renew monitoring efforts on facility capacity and developed site use. Consider changing wording and change the method of measure and/or monitoring frequency.

### **D. Developed Site Service**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Developed Site Service (whether Forest is able to provide service scheduled in the plan)	Annual PAOT-Days FSM (to standard), Mgmt. Attainment Report Item #26, with five-year reporting frequency.	H/H	PAOT-Days FSM (standard) five-year average exceeds or declines from the Forest Plan objective by 10%.

#### **Methods.**

No data collected in fiscal year 2011.

#### **Variation.**

The objective of this measure is to determine whether the Forest is able to provide developed site service scheduled in the Forest Plan. The Forest Plan direction (b) for Goal No. 1 states: "Regulate the opening and closing dates of facilities to serve the public in an efficient and economical manner." Standards and guidelines for managing developed recreation sites state that they be managed "at full service when at least one of the following are met and funding is available to meet them:

- A. A campground is a designated fee site;
- B. More than 20 percent of theoretical capacity is being utilized;
- C. A group campground or picnic ground has a reservation system and/or user fee; or

D. The site is a swimming site, a boating site with a constructed ramp, or at staffed visitor information center.”

**Results.**

No results in fiscal year 2011.

**Interpretation.**

**Is further evaluation needed?** Unknown. Data is not sufficient to determine.

**What are the implications?** Not serving the public in an efficient and economical manner.

**Conclusion.** Data is needed to determine developed site service.

**Monitoring Resources Available.**

No monitoring information available.

**Recommendation.**

Renew monitoring efforts on developed site service. Consider changing wording and change the method of measure and/or monitoring frequency.



## SECTION 3.DEVELOPED RECREATION – PRIVATE

### A. Downhill Ski Area Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Downhill Ski Area Use (is it increasing as projected?)	Annual ski area attendance reports; five-year reporting frequency.	H/H	Five-year average varies from projected demand by more than 20%.

#### Methods.

Annual ski area attendance reports.

#### Variation.

Five-year average varies from projected demand by more than 20%. The projected demand for downhill ski use in the Forest Plan for the 1990 period was 426,000.

#### Results.

Skier-days at Brian Head Resort are less than 50% of capacity.

#### Interpretation.

**Is further evaluation needed?** Yes. The expected use was much less than projected, varying more than 20% from the projected demand of 426,600.

**What are the implications?** Forest Plan direction for ski area management was based on projected increased use that has not been realized.

**Conclusion.** This measure shows that Brian Head Resort has been able to operate over time. The use at Brian Head is not under Forest Service control; monitoring this item would not prompt a management change.

#### Monitoring Resources Available.

Recreation use data is gathered by Brian Head Resort under Special Use Permit.

#### Recommendation.

Drop this monitoring item with a Forest Plan amendment.

## B. Organization Site Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Organization Site Use (are existing sites being fully utilized?)	Permittee occupancy plan, pre-season occupancy reports, post-season regular visits to check occupancy; measure 1 <sup>st</sup> , 5 <sup>th</sup> , 10 <sup>th</sup> year; five-year reporting.	H/H	Unreported private sector vacancies on Forest Land exceeding 10% of the summer season or reported and inventoried vacant periods for which no reservations are received.

### Methods.

The Forest reviews facilities annually in organization sites to ensure that all requirements of the special use permit are being met.

### Variation.

Unreported private sector vacancies on Forest Land exceeding 10% of the summer season or reported and inventoried vacant periods for which no reservations are received.

### Results.

The Forest has one organization camp and the permit requirements are being met.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** This monitoring item is not revealing meaningful information.

### Monitoring Resources Available.

The special use permit is reviewed annually.

### Recommendation.

In 1991, the recommendation was to drop this monitoring item through a Forest Plan amendment. This is still appropriate and recommended.

## SECTION 4. DISPERSED RECREATION

### A. Dispersed Visitor Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Dispersed Visitor Use (summer and winter)	Annual road counters, parking lot counts, trail counters, RIM reports; five-year reporting.	M/L	Visitor use varies from projected demand by greater than 20%.

#### Methods.

The Dixie NF uses both active and passive infrared trail counters, as well as electromagnetic vehicle/trail counters.

#### Variation.

Visitor use varies from projected demand by greater than 20%. The projected demand in the Forest Plan for Dispersed Use was 843,100 RVDs for 1990, and 1,129,900 in 2000 (page II-9).

#### Results.

Dispersed recreation use numbers decreased slightly from the previous year. Most trail counts were static or slightly lower. These findings may be due to a downturn in the economy. Most of the high-use trails tend to be either scenic destination and/or mechanized/motorized route. Across the Forest, non-motorized use numbers were lower in 2011 than previous years.

#### Interpretation.

**Is further evaluation needed?** Unknown. Traffic counters alone do not give sufficient information to conclude if limits were met.

**What are the implications?** The types of dispersed uses occurring on the Forest were not anticipated in the Forest Plan. The measures prescribed in the Forest Plan are not suitable or sufficient to determine if projected demand has been exceeded.

**Conclusion.** Further monitoring of these trails is necessary to create a database with baseline data. The Dixie National Forest has been consistently monitoring dispersed recreation use for the last five years on most trails listed. In order to monitor change over time, trail data needs to be collected, analyzed, and stored annually. With an increasing population growth and an increasing recreating public, trail use is expected to increase. The Dixie National Forest is especially susceptible to increased use due to its proximity to the fast growing city of Las Vegas. In addition, the Dixie National Forest provides many recreation opportunities for motorized recreation, which is the fastest growing sport in the United States.

## Monitoring Resources Available.

There are insufficient funds to monitor dispersed recreation use on the Dixie National Forest in its entirety. The current cost for an individual trail counter is around \$450. With 280 trails constituting 1,600 miles of trails, it is unlikely the Dixie National Forest will ever have the funding or personnel to adequately monitor all dispersed recreation; however, each year the Forest has been able to increase the number of routes monitored and the accuracy of the data collected.

## Recommendation.

Monitoring of dispersed recreation use needs to continue on an annual basis on the Dixie National Forest. Dispersed recreation monitoring by the use of trail counters allows managers to determine current conditions and how use numbers may be changing over time. In addition to number monitoring (trail counters), occurrences of illegal motor vehicle use should be monitored as well to track visitor compliance with the Forest Motor Vehicle Use Map.

## B. Site Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Site Condition (Limits of Change)	Photo points, transects key sites adjacent to water, every five years; five-year reporting.	H/M	Campsite condition below Class III using the Limits of Change Table 1.

## Methods.

No data collected in fiscal year 2011.

## Variation.

Campsite condition below Class III using the Limits of Change Table 1. This is assumed to be Limits of Acceptable Change (LAC).

## Results.

A “Limits of Acceptable Change” process has not been conducted and documented on the Dixie National Forest.

## Interpretation.

**Is further evaluation needed?** Yes, there is a variation on the campsites inventories of data collected to date.

**What are the implications?** Frissell<sup>3</sup> is a subjective measure, rating root damage, bare soil, and vegetation damage, and does not indicate impacts since it does not compare to natural

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<sup>3</sup> Frissell, Sidney S. 1978. Judging recreation impacts on wilderness campsites. Journal of Forestry. 76(8): 481-483. IN: USDA Forest Service Proceedings RMRS-P-15-VOL-5. 2000.

conditions. Southern Utah is arid, resulting in naturally-occurring soil exposure. This may not equate into undesired impacts from use.

**Conclusion.** Dispersed sites have exceeded expectations in the Forest Plan.

#### **Monitoring Resources Available.**

Resources for inventories have not been available. Further inventories may not be available to collect data on remaining sites.

#### **Recommendation.**

Consider dropping use of Limits of Acceptable Change and use of Frissell Classes with a Forest Plan amendment.

Close or rehabilitate campsites that fall below a Class III that are showing unacceptable impacts. Determine the number of campsites needed to meet demands and locate those sites to minimize resource impacts while meeting the needs of the public. Research has shown that it is best to keep open heavily-used sites if other resources are not being impacted and close sites with minimal impacts. Since highly-impacted sites can be difficult and costly to rehabilitate and close, they are often best left open, thereby reducing the spread of impacts to other areas.

### **C. Trail Condition**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Trail condition	Trail condition surveys, 25% annually; reporting every four years.	H/M	Trail mileage classed as inadequate (substandard) exceeds the current inadequate mileage shown in the AMS.

#### **Methods.**

The Forest did not conduct trail inventories during 2011.

#### **Variation.**

Trail mileage classed as inadequate (substandard) exceeds the current inadequate mileage shown in the Analysis of the Management Situation (AMS) in the Forest Plan. The AMS (page II-10) states that at the time of Plan preparation, 462 miles were inadequate, and 175 were adequate.

#### **Results.**

No data collected in fiscal year 2011.

#### **Interpretation.**

**Is further evaluation needed?** Unknown. Data is not sufficient to determine.

**What are the implications?** More trails may be substandard than when the Forest Plan was developed.

**Conclusion.** More data analysis is needed to determine mileages of trails in substandard condition.

#### **Monitoring Resources Available.**

Resources to conduct this monitoring have not been available.

#### **Recommendation.**

Continue to inventory trails on the Forest. Once all trails have been inventoried, establish a funding level to keep trails at their management objective. If funding is not available to meet objectives for all trails, seek volunteers or groups to help maintain critical trails or seek to close those trails with little or no use. Close trails that are no longer needed.

Many of the trails are not adequate to accommodate motorized use. With this type of use rapidly increasing, an adequate motorized trail system needs to be identified and established within motorized ROS classes. Trails outside motorized ROS areas should be closed to motorized use.

### **D. Shifts Between ROS Classes**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Shifts between ROS Classes	Ten-year ROS mapping and reporting.	M/L	If the change between classes is 5% greater than predicted.

#### **Methods.**

In 2002, Geographic Information System (GIS) technologies were used to review the Forest Recreation Opportunity Spectrum (ROS). The different ROS classes (Roaded Natural, Semi-Primitive Motorized, Semi-Primitive Non-Motorized, and Primitive) were identified according to their distance from motorized roads. This effort has not been completed.

#### **Variation.**

If the change between classes is 5% greater than predicted.

#### **Results.**

When the inventory is completed, a comparison can be made of ROS classes that were identified when the Forest Plan was developed.

#### **Interpretation.**

**Is further evaluation needed?** Unknown. Results have not been completed and compared to 1986 ROS mapping.

**What are the implications?** Further analysis is needed.

**Conclusion.** Further information is needed to evaluate ROS classes.

**Monitoring Resources Available.**

Complete the ROS inventory and review.

**Recommendation.**

Complete the ROS inventory and compare to 1986 ROS mapping.

## SECTION 5. WILDERNESS

### A. Campsite Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Condition of campsites and surrounding area (are conditions declining from the current situation?)	Limits of Change at key sites, 5-years monitoring and reporting.	H/M	Limit of Change analysis shows that the Condition Class has declined one class on 25% of inventoried sites.

#### Methods.

No data collected in fiscal year 2011.

#### Variation.

Limit of Change analysis shows that the Condition Class has declined one class on 25% of inventoried sites.

#### Results.

No results in fiscal year 2011.

#### Interpretation.

**Is further evaluation needed?** No, past data are lacking with which to compare recent data regarding the Limit of Change analysis to determine if the Condition Class has declined one class on 25% of inventoried sites. Six (6%) of the inventoried sites are in Frissell Class 4. Based on initial findings, use does not exceed capacity.

**What are the implications?** If the Limit of Change has been exceeded and use trends continue, resource damage could occur.

**Conclusion.** Monitoring to compare existing data is needed to assess potential implications.

#### Monitoring Resources Available.

Forest funding is needed to compile this monitoring.

#### Recommendation.

Continue to monitor recreation use, campsites, and vegetation plots. Change the monitoring method to allow for recent science with a Forest Plan amendment.



## B. Human Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Amount and distribution of human use	Annual trail registration, trail counters, and trailhead counts with periodic intensive sample; annual reporting.	M/M	Human use exceeds area capacity identified in this plan.

### Methods.

Trail registration boxes and trail counters were placed at various locations on the Forest.

### Variation.

Human use exceeds area capacity identified in the Forest Plan. The capacity estimated in the Forest Plan is 26,500 RVDs (page II-13).

### Results.

Although trail registration data were collected, the regularity and meaning of the data are lacking in order to justify displaying the results.

### Interpretation.

**Is further evaluation needed?** Unknown. Data collected are not sufficient to draw conclusions.

**What are the implications?** Unknown.

**Conclusion.** Trailhead registration and trail counters do not provide suitable data to draw conclusions regarding use.

### Monitoring Resources Available.

There are insufficient funds to monitor human use on the Dixie National Forest in its entirety. It is unlikely the Dixie National Forest will ever have the funding or personnel to adequately monitor all human use impacts; however, each year the Forest has been able to increase the number of routes monitored and the accuracy of the data collected.

### Recommendation.

Continue monitoring with trail counters.

## SECTION 6.CULTURAL RESOURCES

### A. Cultural Resource Investigations

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Completion of cultural resource investigation for all site-disturbing projects where no inventory has been completed in the past.	Annual management review and reporting.	H/H	Failure to accomplish is a performance problem and does not indicate a need to change management direction.

#### Methods.

Management review of 2011 cultural resource survey.

#### Variation.

Failure to accomplish is a performance problem and does not indicate a need to change management direction.

#### Results.

27 cultural resources investigations were completed on ground-disturbing projects during 2011 (see Table 1). A total of 27 sites were recorded on 1,280 acres surveyed.

**Table 1. Number of projects, acres surveyed and number of sites recorded of heritage resource surveys on the Dixie National Forest during 2011.**

Year	Number of Projects	Acres Surveyed	# Sites Recorded
2011	27	1,280	27

#### Interpretation.

Is further evaluation needed? No.

What are the implications? None.

**Conclusion.** Site-disturbing projects are being surveyed as needed.

#### Monitoring Resources Available.

Budgeting to support surveys for site-disturbing projects have been adequate.

#### Recommendation.

Continue to survey site-disturbing projects.

**Figure 1. Documenting historical canal near New Harmony.**



## SECTION 7. SCENIC RESOURCES

### A. Compliance with Visual Quality Objectives

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Visual Quality Objectives	Annually, Landscape Architect evaluate one retention corridor selected at random, Landscape Architect evaluate a minimum of two or 10% (whichever is more) of previous year's projects, selection at random from list of previous year's completed projects; annual reporting.	H/M	Corridor contains more than 2% of view area which does not conform to the Visual Quality Objective, more than one sampled project does not meet VQO in a given year, or one or more projects in two successive years do not meet VQO.

#### Methods.

In 1996, the Forest Service changed direction from USDA Handbook 462, *The Visual Management System* to USDA Handbook 701, *Landscape Aesthetics: A Handbook for Scenery Management* (October 1996). The Chief of the Forest Service directed employees to "...begin using the concepts and terms contained in this Handbook as you work on new projects or initiate Forest Plan revisions." As a result of this direction, the Dixie changed to the Scenery Management System (SMS) and to Scenic Integrity Objectives (SIO) instead of Visual Quality Objectives. Following these directions, the Forest was completely remapped in 2000 using the new system and a Forest Plan amendment was completed.

#### Variation.

Corridor contains more than 2% of view area which does not conform to the Visual Quality Objective, more than one sampled project does not meet VQO in a given year, or one or more projects in two successive years do not meet VQO.

#### Results.

Along the major travel routes with heavy use by those interested in the scenery, the Scenic Integrity Objective (SIO) has a high scenic integrity and the valued landscape character appears to be intact. In a landscape with a moderate scenic integrity, the valued landscape may appear slightly altered.

Most of the major travel corridors on the Cedar City District have received management activities during this monitoring period. These activities have been treatments in response to the spruce beetle infestation occurring on the District. Some of these management activities did not retain the SIOs along the major travel corridors.

The Powell District had two timber sales along major travel corridors. Portions of East Creek are located along the Great Western Trail that should be managed to retain a high Scenic Integrity Objective. Timber removal in these areas thinned the stands to existing levels, but managed to retain the visual character of a ponderosa pine stand.

**Interpretation.**

**Is further evaluation needed?** Yes. Due to beetle infestations and subsequent harvesting, there are areas that do not meet SIOs.

**What are the implications?** Scenic views have been impacted.

**Conclusion.** Stochastic events such as beetle infestations can impact scenic integrity over which the Forest has no control.

**Monitoring Resources Available.**

Forest Landscape Architects conduct most of the monitoring with some assistance from the Districts.

**Recommendation.**

Use a Forest Plan amendment to correspond current monitoring with using the Scenery Management System. Areas involved in the insect infestation should be identified and an interim SIO<sup>4</sup> until a plan can be developed to bring the visual characteristics back in line with a high scenic integrity. Develop a vegetation management strategy for Management Area 2B, travel corridors. The goal would be to maintain forest health and prevent further outbreaks of insects and disease, thus maintaining the visual variety of the landscape most seen by the public.

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<sup>4</sup> SIO is Scenic Integrity Objectives

## SECTION 8. WILDLIFE AND FISH

### A. Big Game

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Big game (mule deer and elk)	Annual UDWR harvest and classification data, winter range rides, aerial reconnaissance, pellet transects; annual reporting.	M/M	Prior to reaching optimum Forest populations, a downward population trend of 10% over 3 years. Once optimum populations are reached, a 20% total population or hard [herd] composition change over a five-year period.

#### Methods.

UDWR classification data, winter range rides, and aerial recognizance were used in monitoring these species. Data were primarily collected by UDWR and evaluated by the Forest Service.

#### Variation.

Prior to reaching optimum Forest populations, the variation causing further evaluation is a downward population trend of 10% over 3 years. Once optimum populations are reached, variation is 20% total population or herd composition change over a five-year period. Optimum populations are considered as management unit objectives established by the UDWR.

#### Results.

##### Mule Deer and Rocky Mountain Elk

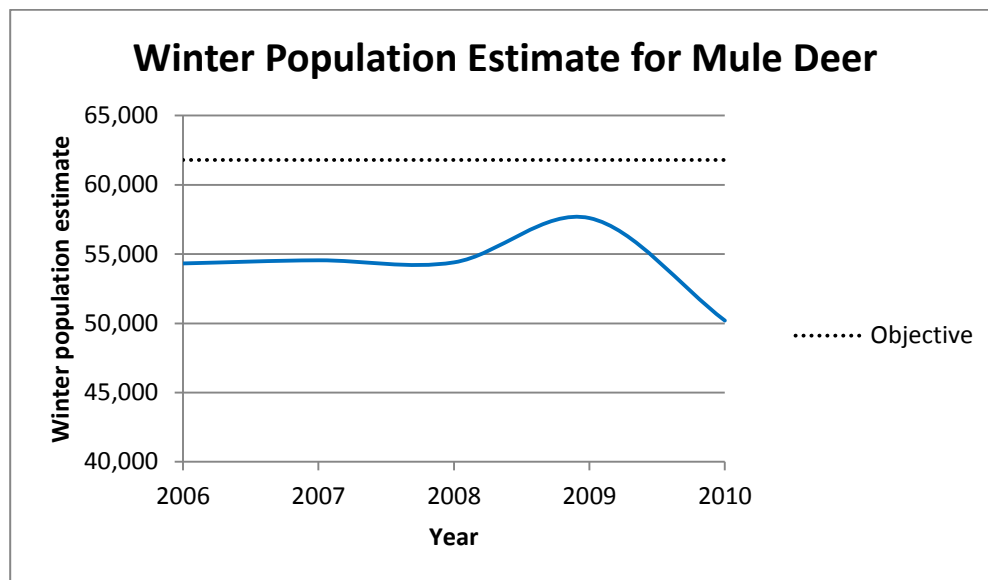
The Dixie NF contains portions of seven different Wildlife Management Units (WMUs) in the Southern Region: Boulder Plateau, Kaiparowits, Mount Dutton, Panguitch Lake, Paunsaugunt, Pine Valley, and Zion. Currently, elk habitat has not been defined within the Pine Valley WMU, although the UDWR manages a limited number of elk in the area. The deer and elk data below comes from the 2010 Utah Big Game Annual Report (UDWR 2010a).

Table 2 below displays winter population estimates from 2006-2010 for mule deer in the seven WMUs that overlap the Dixie NF, including two additional Boulder units.

**Table 2. Mule Deer Winter Population Estimates by WMU**

WMU	% Useable habitat within Dixie NF	Management Plan Objective	2006	2007	2008	2009	2010
Boulder Plateau	50%	22,600	17,000	15,800	12,000	15,500	12,500
Kaiparowits	3%	1,000	400	400	1,000	400	400
Mount Dutton	62%	2,700	2,000	2,300	2,500	2,400	1,800
Panguitch Lake	61%	8,500	8,925	8,700	10,000	10,500	8,100
Paunsaugunt	15%	5,200	6,500	6,600	6,000	5,800	4,900
Pine Valley	55%	12,800	12,500	13,400	13,400	13,400	12,600
Zion	9%	9,000	7,000	7,350	9,500	9,600	9,900
<b>Total:</b>	<b>35%</b>	61,800	54,325	54,550	54,400	57,600	50,200

The chart below displays the data provided in the table above.



\*Objective determined in Deer Management Plan

The Dixie NF contains summer, winter, and year-round habitat for mule deer populations. Amount of habitat varies with WMU, and altogether the Dixie National Forest administers only 35% of useable habitat within the seven WMUs (Table 2). Accurate estimates of populations on the Boulder Plateau are obscured due to the addition of the Fishlake and Thousand Lakes Boulder units. With the exception of the Zion unit, all units are under objective.

All big game species in Utah are managed by the UDWR. The Regional Advisory Council (RAC) process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management. The Forest Service has a representative on the RAC; however, the Forest in no way has control over population numbers. It should be noted that a WMU may be within approved population objectives, and as a result of UDWR management strategies, population numbers may be reduced.

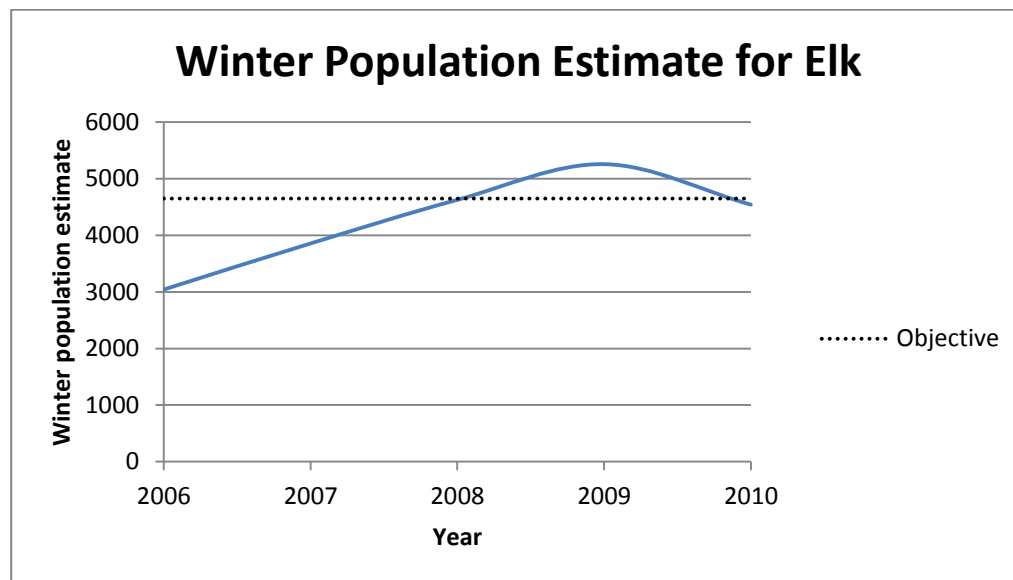
Deer populations appear to be healthy and will continue to persist across the Forest.

The table below displays winter population estimates from 2006-2010 for elk in the six WMUs that overlap the Dixie NF.

**Table 3. Elk Winter Population Estimates by WMU**

WMU	% Useable habitat within Dixie NF	Management Plan Objective	2006	2007	2008	2009	2010
Boulder Plateau	58%	1,500	500	900	1,500	1,800	1,500
Kaiparowits	51%	25	25	25	25	25	50
Mount Dutton	77%	1,500	1,270	1,400	1,500	2,000	1,750
Panguitch Lake	75%	1,100	872	950	1,000	800	775
Paunsaugunt	33%	175	24	30	50	100	140
Pine Valley		50	50	50	50	50	50
Zion	5%	300	300	500	500	480	275
<b>Total:</b>	<b>54%</b>	4,650	3,041	3,855	4,625	5,255	4,540

The chart below displays the data provided in the table above.



\*Objective determined in Elk Management Plan

The Forest contains summer, winter, and year-round habitat for elk populations. The amount of habitat within the Forest varies with WMU, and altogether the Dixie National Forest administers only 54% of useable habitat within the six WMUs (Table 3).

Elk populations appear to be healthy and will continue to persist across the Forest.



## **Interpretation.**

**Is further evaluation needed?** No, mule deer populations have only shown a decline in the last recorded year, and variation is determined over a three-year period. Elk populations are meeting current objective population goals.

**What are the implications?** There are many factors influencing deer and elk populations, including weather, winter range conditions, calving and fawning conditions, forage, disease, predation, and hunting. The elk and deer units on the Dixie National Forest extend beyond the boundaries of the Forest, particularly winter range. Therefore, conditions on lands other than those occurring on National Forest System lands influence these populations. Deer winter range conditions and areas available have been declining and are a major factor for declines of these deer herds. The UDWR is holding elk populations in check with accelerated hunting opportunities in certain units. This causes variable fluctuations in populations.

**Conclusion.** The Regional Advisory Council and the Wildlife Board, both of which are influenced by the Forest Service by recommendation only, must approve any changes in population objective and harvest changes. Forest Service does not control population objectives or harvest limits.

## **Monitoring Resources Available.**

UDWR conducts harvest and classification data, aerial reconnaissance, and models the population estimates.

## **Recommendation.**

Continue monitoring the big game species in cooperation the UDWR; renew monitoring with pellet counts. Review elk and deer as Management Indicator Species to determine if their use as indicators is valid. A Forest Plan amendment may be needed if elk and deer are found to be inadequate management indicators.

## **Citations**

Utah Division of Wildlife Resources (UDWR). 2010a. Utah Big Game Annual Report. Pub.No 11-23.

## B. Wild Turkey

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Wild Turkey	Annual UDWR harvest data, sighting records of reliable persons. Habitat evaluation during pre- and post-timber sale reviews and range analysis; annual reporting.	M/M	10% total decline in population size over a 3-year period and/or loss of important habitat components; i.e., roost trees in 2 or more areas of essential habitat as designated by UDWR and FS.

### Methods.

UDWR harvest data, sightings from qualified persons, and habitat evaluations have been conducted. Habitat evaluations conducted were documented in wildlife specialist reports and through implementation, effectiveness, and validation monitoring efforts.

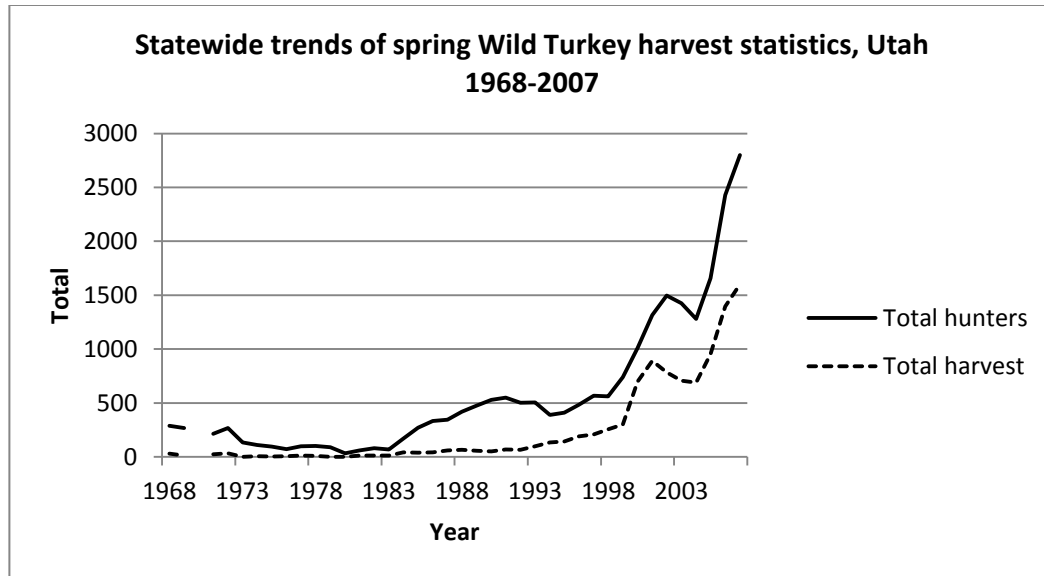
### Variation.

10% total decline in population size over a 3-year period and/or loss of important habitat components; i.e., roost trees in 2 or more areas of essential habitat as designated by UDWR and FS.

### Results.

Utah's wild turkey populations are thriving and expanding across the state; they've grown so much, in fact, that the Utah Wildlife Board approved Utah's first statewide general-season turkey hunt for 2010 (UDWR 2009). The RAC process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management.

Based on the data provided by the UDWR (UDWR 2010b), the total harvest of turkey in Utah has increased sharply in recent years. The chart below shows this increase, which also reflects an increase in birds Statewide, including the Southern Region and lands administered by the Dixie NF.



\*No spring season in 1970.

\*\*2002-2004 data does not include conservation permit information.

\*\*\*2005 data does not include conservation permit or landowner permit information.

Based on this information, turkey populations are in an upward trend; therefore, populations are persistent in the Southern Region, including lands administered by the Dixie NF.

Incidental sightings are recorded inconsistently across the Forest. Habitat evaluation occurs within project-specific analyses.

### **Interpretation.**

**Is further evaluation needed?** No, wild turkeys have not declined more than 10% over a three-year period. There are insufficient data regarding important habitat components.

**What are the implications?** Winter severity and length have a much larger impact on turkey populations than management activities on the Dixie National Forest. Turkeys are habitat generalists and therefore may not reflect changes in the landscape that indicate whether we are moving toward desired conditions. Wild turkey population fluctuations do not reflect management activities and are not suitable as a Management Indicator Species.

**Conclusion.** Wild turkey population fluctuations do not reflect management activities and are not suitable as a Management Indicator Species.

### **Monitoring Resources Available.**

UDWR gathers and compiles the data for wild turkey.

### **Recommendation.**

Drop wild turkey as a Management Indicator Species with a Forest Plan amendment. Otherwise, continue to work with the UDWR to gather and compile data for wild turkey.

## Citations

Utah Division of Wildlife Resources (UDWR). 2010b. Utah Upland Game Annual Report. Pub. No. 11-21.

\_\_\_\_\_. 2009. 2010 Utah Turkey Guidebook. Accessed 12-8-2009; available from [http://wildlife.utah.gov/guidebooks/2010\\_turkey/2010\\_turkey\\_high.pdf](http://wildlife.utah.gov/guidebooks/2010_turkey/2010_turkey_high.pdf)

## C. Northern Goshawk

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Goshawk	Nest survey for goshawk. Variable strip transect for goshawk annually if population near minimum level, or every 2-5 years in project areas; annual reporting.	M/M	10% total declining goshawk population size over a 3-year period.
Are known goshawk territories on national forests remaining occupied? <sup>5</sup>	Annual goshawk territory occupancy at the Forest level; reporting every 3 years.	NA	More than 20% decline in territory occupancy over a 3-year period.

### Methods.

Goshawk nest surveys and territory occupancy monitoring are conducted across the Forest. These methods, while very time-consuming, have been implemented and are effective.

### Variation.

Population data are inferred from the number of active nests and occupied territories in relation to the number of known territories monitored.

Less than 20% declines in territory occupancy over a 3-year period is specified in the Utah Northern Goshawk Amendment as an acceptable range. The Forest Plan states 10% total declining goshawk population size over a 3-year period is a variation causing further evaluation.

Monitoring required in the Forest Plan and in the Goshawk Amendment are essentially the same and are therefore reported and evaluated here together.

### Results.

Out of 183 existing goshawk territories on the Dixie National Forest, 120 were monitored in 2011. Table 4 shows goshawk monitoring results for the previous six years. The increase in territories monitored is due to the discovery of new territories. Additional territories were very likely occupied, but the absence of bird detections during the site visit prevented categorizing them as such.

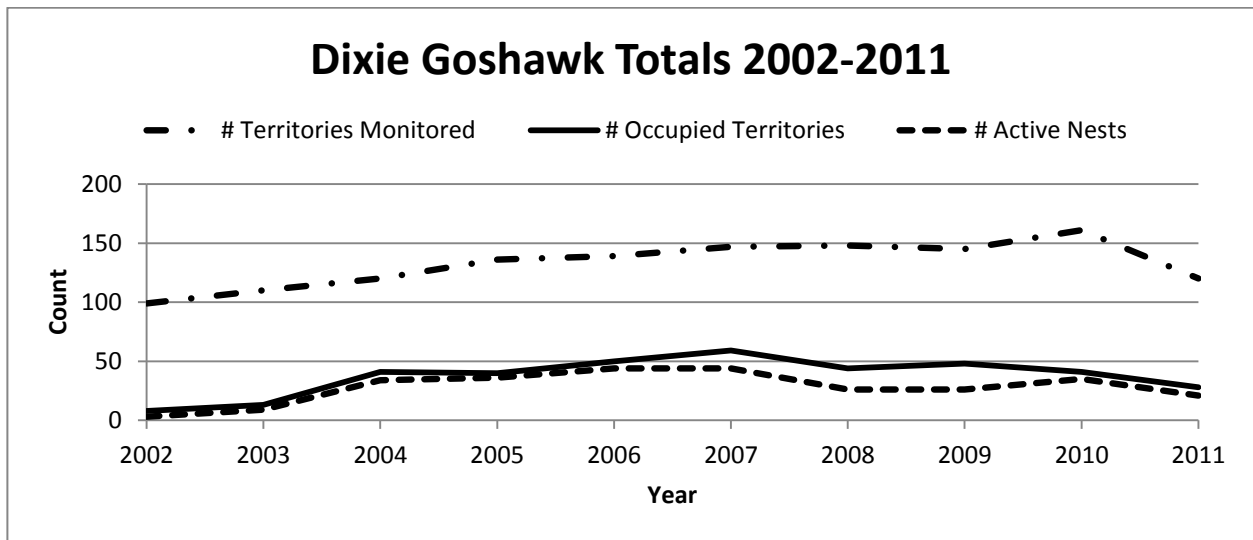
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<sup>5</sup> Utah Northern Goshawk Project Decision Notice 2000, including a Forest Plan Amendment.

**Table 4. Summary Results of Northern Goshawk Monitoring on the Dixie National Forest, 2006-2011**

Northern Goshawk Monitoring Results						
Status	2006	2007	2008	2009	2010	2011
Territories Monitored	138	148	149	144	161	120
Occupied Territories	50	59	44	47	42	28
Active Nests	44	44	26	26	35	21

**Figure 2. The chart below shows monitoring results for the Dixie NF from 2002-2011.**



### Interpretation.

**Is further evaluation needed?** No, population and territory occupancy trends are evaluated over a three-year period; the current decline has only been for two years, and active nests only declined in the last year.

**What are the implications?** Goshawk populations on the Dixie National Forest fluctuate within reproductive seasons, and from season to season. They are affected by a number of factors such as drought, cold and wet early spring conditions, low prey densities, significant wind events, fire, modified vegetation in the landscape, and predators. As a result of a combination of these events across the Forest over the past several years, the number of occupied goshawk territories on the Forest may decrease, but not indicate a downward population trend. In addition, recent science has suggested that monitoring of populations at an individual Forest level may not be appropriate (Woodbridge and Hargis 2006).

**Conclusion.** Although overall numbers fluctuate, the number of occupied goshawk territories across the Forest is high and well-distributed among Ranger Districts. These results may indicate that our present method of managing the habitat is adequate.

### **Monitoring Resources Available.**

Funding is provided to monitor territory occupancy each year. Territories are also prioritized according to likelihood of occupancy, and all high-priority territories were monitored in 2011. Funding for project-specific survey work is also available.

### **Recommendation.**

Because the northern goshawk is a Region 4 Sensitive Species, it is recommended to continue to monitor goshawk territories. This item in the Forest Plan has been updated with the Utah Northern Goshawk Project Amendment, and should be dropped to avoid repetition. Consider changing wording of variation to be consistent with recent science.

### **Citation.**

Woodbridge, B. and C.D. Hargis. 2006. Northern Goshawk Inventory and Monitoring Technical Guide. Gen. Tech. Rep. WO-71. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p.

## **D. Northern (Common) Flicker**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Common [Northern] Flicker	Variable strip transect, sighting records of reliable persons, annually if population near minimum level, or every 2-5 years in project areas; annual reporting.	L/M	25% decline in population size over a 5-year period

### **Methods.**

All five Ranger Districts were monitored in 2011 for northern flicker.

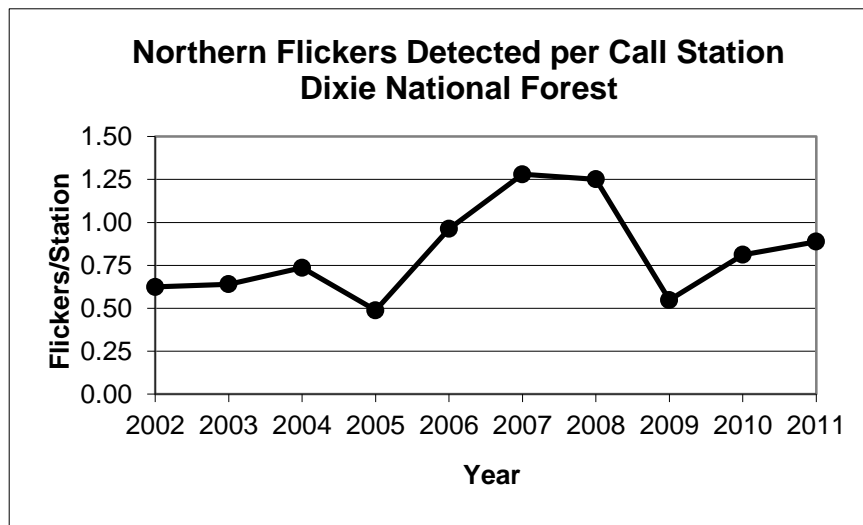
### **Variation.**

The variation causing further evaluation for northern flickers is a 25% decline in population size over a 5-year period.

### **Results.**

The chart below shows northern flicker detections per call station from 2002-2011 on the Dixie NF.

**Figure 3. The chart below shows monitoring results for the Dixie NF from 2002-2011.**



A total of 205 flickers were detected in surveys of 182 call stations, resulting in a detection rate of 0.89 flickers per station in 2011. This is an increase from 0.81 flickers per station in 2010. Detection rate was lowest in 2005 (0.49 flickers/station), and highest in 2007 (1.28 flickers/station). The variation in detection rates is likely due to changes in precipitation, insect populations, and weather conditions during the monitoring period.

#### **Interpretation.**

**Is further evaluation needed?** No. Forest data collected in 2011 indicate an increase in flickers across the Forest.

#### **What are the implications?**

This species is well-distributed, occurring on each Ranger District over a variety of habitat types. Protective measures exist under the snag and downed woody debris standards and guidelines of the Forest Plan. These measures are implemented Forest-wide, and are effective in managing and protecting important habitats for cavity nesters, including flickers.

**Conclusion.** Northern flicker populations appear to be viable across the Dixie National Forest and in Utah.

#### **Monitoring Resources Available.**

Funding is available for monitoring each year.

#### **Recommendation.**

Continue to monitor Common [Northern] Flicker populations on the Forest.

## E. Native cutthroat trout: Bonneville/Colorado River

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Native cutthroat trout: Bonneville, Colorado River	Accepted methods, such as gill netting, electro-shocking, or creel census, in coordination with UDWR when possible. 7-year revisit interval with annual reporting.	M/H	20% decline in occupied habitat of any single population over a 7-year period or a major change in size or quality of catch.

### Methods.

UDWR is the agency with primary responsibility for monitoring core and conservation populations of Bonneville cutthroat trout (BCT) and Colorado River cutthroat trout (CRCT) in southern Utah; however, Forest personnel cooperate and assist with sampling. Sampling in streams consists of multiple-pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length, and weighed. Density, standing crop, and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length, and weighed. Catch rate and condition factor are calculated. Results for sport fishing populations of BCT and CRCT are reported with MIS nonnative trout.

### Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a seven-year period or a major change in size or quality of catch.

### Results.

UDWR and Forest personnel last completed cooperative sampling efforts on all known core and conservation stream populations of BCT from 2008-2010 and CRCT from 2006-2007 (Hadley et al. 2008; Hadley et al. 2010; Hadley et al. 2011). From the results of these surveys, Forest personnel estimated that occupied habitat for Forest BCT core and conservation populations had declined by approximately 35% compared to the maximum known occupied habitat, and average standing crop across these populations had declined by over 50% (Dixie National Forest 2011). The Forest identified impacts from the 2002 Sanford and Sequoia fires as the primary reason for the loss of both occupied habitat and standing crop and is currently working on fire management recommendations in native cutthroat watersheds (Dixie National Forest 2011). CRCT occupied habitat remained stable and average CRCT standing crop across populations increased by 52%.

In 2011, Forest and UDWR personnel conducted sampling for BCT in five streams and one lake. Cooperative qualitative sampling by UDWR and Forest personnel in Sandy Creek and Left Fork Sanford Creek confirmed that BCT were no longer present in these streams. Sandy Creek and Left Fork Sanford Creek were assumed fishless and stocked with BCT in 1999 (Hepworth et al. 2003). During 2002 sampling, a few fish were found in Sandy Creek; however, no fish were found in 2011 and habitat appeared marginal at best, despite the above-



average water year. The reintroduction in Left Fork Sanford Creek originally fared better and had expanded to encompass 1.8 miles of stream at an average standing crop of 35 kg/ha by 2002; however, the 2002 Sanford Fire burned about 20% of the Sanford Creek 6<sup>th</sup> field Hydrologic Unit Code watershed at moderate to high severity. Flooding and debris flows following the fire eliminated the fish community in Left Fork Sanford Creek. Sampling in 2011 confirmed that fish were eliminated from Left Fork Sanford Creek but observed that habitat conditions appeared to have improved to the point that BCT could be reintroduced to this stream (Dixie National Forest Fish Surveys 2011, 2012).

Qualitative sampling in 2009 identified cutthroat trout in Little Creek and investigations on the source of these fish found that BCT from the Manning Meadows brood stock had been stocked in the 1990s and Yellowstone cutthroat trout had been stocked in the 1980s. Until 2009, it was thought that both stockings had failed. Results of genetic samples collected in 2011 confirmed that the fish in Little Creek were 100% BCT (Evans et al. 2011). Sampling in 2010 and 2011 found that BCT are distributed throughout at least 7.2 miles of stream on the Forest, along with about 3.0 miles of stream on Bureau of Land Management administered lands downstream from the Forest (Golden and Mecham 2010; Golden et al. 2010; Golden 2012). Sampling in 2011 showed stable to increasing standing crop estimates for BCT in this stream (Table 5).

UDWR stocked BCT from the Manning Meadows brood stock into East Fork and West Fork Hunt Creek in 2007 (Hadley 2009a; Hadley 2009b). Visual observations of fish by UDWR and DNF personnel in 2009 and 2010 prompted DNF personnel to conduct qualitative sampling efforts in early summer 2011. Those efforts found BCT at two locations on East Fork Hunt Creek and one location on West Fork Hunt Creek (Golden 2012). In August 2011, BCT were found at both quantitative stations established on West Fork Hunt Creek and one of the two quantitative stations established on East Fork Hunt Creek. BCT standing crop in West Fork Hunt Creek was low when compared to other southern Utah trout streams and nonexistent at the downstream station in East Fork Hunt Creek (Hepworth and Beckstrom 2004). BCT occupied at least 1.4 miles of stream in West Fork Hunt Creek and an undetermined amount of stream in East Fork Hunt Creek. BCT were introduced to these streams because nonnative trout were not present. The fact that nonnative trout had not been introduced and had not proliferated in these streams is a good indicator of marginal trout habitat. Temperature data and flow volume estimates/observations provide additional evidence of the marginal habitat in the Hunt Creeks (Golden 2012).

Rob's Reservoir was sampled for the first time since the Center Creek system was restored from 2002-2004. Catch rate for BCT was 2.75 per hour, which is roughly equivalent to 33 fish per net night (using a 12 hour net night). Fish were relatively small (average total length 183 mm), but in average condition.

Hall Creek is a tributary to Birch Creek in Main Canyon. Water Canyon Creek is home to a remnant CRCT population and is also a tributary to Birch Creek. CRCT have been found in Birch Creek from Water Canyon Creek upstream past the Hall Creek confluence (Hadley et al. 2008). Qualitative investigations of Hall Creek found cutthroat trout that appear to be CRCT throughout at least 1.7 miles of stream (Golden 2012). Genetic samples were collected by UDWR and results are pending, but it is expected that these fish will be the same as those in the Water Canyon Creek remnant population.

The conservation population of CRCT in Pine Creek Reservoir was also sampled in 2011. Sampling showed that catch rate of CRCT increased by 156% between 2006 and 2011; however, the 2011 sampling showed CRCT with a smaller average size and lower condition factor.

**Table 5. Name, year sampled, species collected, average total length (range in parentheses), condition (K) factor, density (#/ha; 95% confidence interval in parentheses), standing crop (kg/ha; 95% confidence interval in parentheses), and percent (%) change in standing crop between most recent sampling years for FY2011 BCT and CRCT stream sampling locations.**

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing crop (kg/ha)	% change in standing crop
Little Creek BLM	2011	Cutthroat trout	208 (76-254)	0.98	337 (270-404)	38 (14-51)	na
Little Creek downstream	2011	Cutthroat trout	122 (42-265)	1	556 (444-667)	32 (4-69)	**
	2011	Speckled dace	75 (63-92)	na	1,000 (889-1,111)	5 (1-5)	-74
	2010	Cutthroat trout	na	na	0	0	na
	2010	Speckled dace	69 (45-90)	na	5,308	19	na
Little Creek upstream	2011	Cutthroat trout	204 (165-293)	1.13	441	47 (19-74)	-6
	2010	Cutthroat trout	174 (130-255)	0.99	776	50 (15-85)	na
East Fork Hunt Creek downstream	2011	Southern leatherside	110 (94-135)	na	2,900	39 (37-41)	na
		Mountain sucker	136 (111-157)	na	700	20 (17-24)	na
East Fork Hunt Creek upstream	2011	Bonneville cutthroat trout	92 (30-252)	0.97	5,381 (5,098-5,664)	107 (69-148)	na
		Mountain sucker	140 (124-161)	na	10	17 (13-20)	na
West Fork Hunt Creek downstream	2011	Bonneville cutthroat trout	183 (135-305)	0.891	250	18 (6-29)	na
		Southern leatherside	107 (72-135)	na	1,375 (1,292-1,458)	14 (11-16)	na
		Mountain sucker	141 (122-166)	na	1,000 (917-1,083)	27 (22-33)	na
		Redside shiner	72 (64-83)	na	375 (333-417)	1	na
West Fork Hunt Creek upstream	2011	Bonneville cutthroat trout	194 (170-255)	0.866	291 (255-327)	19 (1-42)	na
		Southern leatherside	101 (81-123)	na	2,436 (2,327-2,545)	27 (24-30)	na
		Mountain sucker	134 (106-141)	na	1,455 (1,382-1,527)	43 (38-48)	na
		Redside shiner	70 (66-76)	na	727 (364-1,091)	2 (1-4)	na

**Table 6. CRCT catch rate (#/net night, average total length (mm) and average condition factor (K) during 2011 sampling and prior sampling in 2006 at Pine Creek Reservoir.**

Lake	Year	Catch rate (#/net night)	Average length (mm)	Average condition factor
Pine Creek Reservoir	2011	59	262	1.09
	2006	23	326	1.15

### **Interpretation.**

**Is further evaluation needed?** Another year of quantitative sampling should be completed on Little Creek to develop a three-year baseline to judge future monitoring efforts against. After this baseline is established, quantitative stations on Little Creek should continue to be monitored with other BCT core and conservation populations on a seven-year interval. Additional distributional sampling should also be continued to map the maximum occupied habitat for BCT in Little Creek.

Discharge and temperature measurements should be continued on both East and West Fork Hunt Creek to compare with future fish results and determine the potential persistence of this population. Additional distributional sampling should be conducted to map the upstream extent of fish in these streams.

Distributional sampling should be conducted to map the maximum occupied habitat for CRCT in Hall Creek. Quantitative sampling stations should be established on Hall Creek and added to the suite of streams monitored on a seven-year interval.

### **What are the implications?**

- Sandy Creek will not be pursued as a location for future BCT reintroduction attempts.
- Habitat in Left Fork Sanford Creek may have recovered enough to allow for BCT reintroduction.
- The Little Creek population of BCT will be managed as a conservation population by the State of Utah.
- East Fork and West Fork Hunt Creek may be determined to be conservation populations of BCT pending the future persistence of these populations.
- If Hall Creek cutthroat trout are a genetic match to those in Water Canyon Creek, then the system connecting the two tributaries will be managed as a core CRCT population.

**Conclusion.** Monitoring activities in 2011 showed an expanded range for BCT and CRCT on the Forest, as well as potential opportunities to continue population expansion for both species.

### **Monitoring Resources Available.**

Currently, BCT and CRCT monitoring on the Forest is accomplished by cooperation and coordination with UDWR. Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

## Recommendation.

Continue to work with UDWR to accomplish BCT and CRCT monitoring objectives, while identifying potential population expansion opportunities for the two species.

## Citations

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## F. Virgin spinedace

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Virgin spinedace	Accepted methods, such as electro-shocking, in coordination with UDWR when possible. 5-year revisit interval with 5 year reporting.	M/H	20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success.

### Methods.

The Forest and UDWR cooperatively monitor Virgin spinedace with multiple-pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, and measured for total length and weighed. Density is calculated.

### Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a five-year period or in age class structure or reproductive success.

### Results.

Moody Wash represents the only known habitat for Virgin spinedace on the Forest. Qualitative and quantitative sampling was last conducted in 2009 and 2010. No sampling was conducted in 2011.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None

**Conclusion.** None

### Monitoring Resources Available.

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

### Recommendation.

Identify upstream extent of Virgin spinedace in Racer Canyon (a tributary of Moody Wash) and repeat quantitative monitoring by 2014.

## G. Southern leatherside

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Southern leatherside	Accepted methods, such as electro-shocking, in coordination with UDWR when possible. 5-year revisit interval with 5 year reporting.	M/H	20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success.

### Methods.

The Forest and UDWR cooperatively monitor southern leatherside with multiple-pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length, and weighed. Density is calculated.

### Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a seven-year period or a major change in size or quality of catch.

### Results.

Known southern leatherside populations on the Forest were monitored in 2009 and 2010. During BCT sampling efforts in East Fork and West Fork Hunt Creek, southern leatherside were found in both streams (Table 5) (Golden 2012). Southern leatherside were found to occupy at least 1.4 miles in West Fork Hunt Creek and an undetermined amount of streams. Density was low in West Hunt Creek and low to moderate at the downstream station in East Hunt Creek.

### Interpretation.

**Is further evaluation needed?** No. Discharge and temperature measurements should be continued on both East and West Fork Hunt Creek to compare with future fish results and determine the potential persistence of this population. Additional distributional sampling should be conducted to map the upstream extent of fish in these streams.

**What are the implications?** The Hunt Creek system could contain a conservation population of southern leatherside.

**Conclusion.** The Hunt Creek system could contain a conservation population of southern leatherside; however, use of the system may be ephemeral.

### Monitoring Resources Available.

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

## Recommendation.

Continue to work with UDWR to accomplish southern leatherside monitoring objectives, while identifying potential population expansion opportunities for the species. Resample all southern leatherside streams on the Forest in 2014 and 2015.

## Citations

Golden, M. 2012. *Dixie National Forest Fish Surveys FY2011*. Cedar City, UT: Dixie National Forest, Supervisor's Office.

## H. Nonnative trout: brook, brown, rainbow, cutthroat

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Non-native trout: brook, brown, rainbow, cutthroat	Accepted methods, such as gill netting, electro-shocking, or creel census, in coordination with UDWR when possible. 5-year revisit interval; at least 15 streams per year. Annual reporting.	M/H	20% total decline in estimated biomass(streams)/catch rate(lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch.

## Methods.

Nonnative trout sampling across the Forest is accomplished by cooperative efforts between Forest personnel and UDWR. While some sampling is conducted by each agency independently, sampling results are shared to maximize each agency's effectiveness. Sampling in streams consists of multiple-pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length, and weighed. Density, standing crop, and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length, and weighed. Catch rate and condition factor are calculated. Additional qualitative sampling was conducted in several streams to determine species composition and distribution. Qualitative sampling consisted of sampling high-quality fish habitat with a backpack electrofishing unit. Results for sport fishing populations of BCT and CRCT are included in the following results.

## Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% decline in estimated biomass (streams)/catch rate (lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch.

## Results.

Qualitative sampling for nonnative trout was completed at nine locations in 2011 (Table 7). Nonnative rainbow trout were found in low densities in both Caddy Creek and Bowery Creek. Flow volume may be a limiting factor in Caddy Creek, as are the flow manipulations out of Yankee Meadows Reservoir in Bowery Creek. Additionally, qualitative sampling in 2011 identified several streams that may be suitable for reintroduction of BCT: Lloyd Creek,

Cottonwood Creek, and North Fork Cottonwood Creek. Additional evaluations should be completed in all these streams.

**Table 7. Qualitative stream fish sampling sites, DNF Ranger District, and fish species collected in FY2011.**

<b>Sampling site</b>	<b>Ranger District</b>	<b>Species collected</b>
Lloyd Creek	Pine Valley	None
Bowery Creek	Cedar City	Rainbow trout
Caddy Creek	Cedar City	Rainbow trout
Cottonwood Creek	Cedar City	None
North Fork Cottonwood Creek	Powell	None
Seiler Creek below weir	Powell	Brook trout, mountain sucker, speckled dace
Skunk Creek above pond #1	Powell	Speckled dace
Skunk Creek above pond #2	Powell	None
Upper Valley Creek <sup>a</sup>	Escalante	Speckled dace

<sup>a</sup> Not on DNF.

Quantitative sampling for nonnative trout was completed at 13 locations in 2011 (Table 8). Average standing crop of MIS nonnative trout for DNF streams sampled in 2011 was 160 kg/ha. This would be considered above average when compared to other southern Utah trout streams (Hepworth and Beckstrom 2004). Average standing crop of MIS trout from DNF quantitative fish sampling efforts from 2003-2010 was 125 kg/ha, so the average standing crop for sites sampled in 2011 was higher than average, but was still within the range of standing crop estimates from prior years (Dixie National Forest 2011). One stream, Seiler Creek, had no fish present, but this is the result of limited habitat combined with a weir structure that inhibits upstream movement (Golden 2012).

Of the quantitative sites sampled in 2011, ten had an MIS trout standing crop estimate available from a prior year's sampling effort. The percent change in standing crop between the prior year and 2011 was extremely variable, ranging from a 64% decline to a 174% increase. The Forest Plan, as amended, specifies that for MIS nonnative trout, a 20% total decline in estimated biomass Forest-wide over a 5-year period or a major change in size or quality of catch is the "variation which would cause further evaluation and/or change in management direction." On average, the standing crop estimates for the 12 sites sampled in 2011 increased by 20% over the estimates from the prior years. Data collected in 2011 do not suggest a Forest-wide decline in MIS trout standing crop.

Declines of greater than 20% in MIS trout standing crop occurred at three of the ten sites with multiple years of sampling data. The 2005 North Fork Pinto Creek sampling effort was in late autumn, whereas the sampling effort in 2011 was in late June. Average size of rainbow trout collected in 2011 was considerably smaller, which resulted in the decrease in standing crop



between the two years. Seasonal movements or growth of fish between early summer and late autumn may have contributed to the discrepancy in standing crop between the two sampling years (Golden 2012). The differences between 2004 and 2011 estimates of standing crop in Bunker Creek and Left Fork Bunker Creek may well be explained by differences in the water years, flow volume, and available habitat between sampling years (Golden 2012). Additionally, standing crop estimates for brook trout in Left Fork Bunker Creek and Bunker Creek would still be considered exceptional when compared to other southern Utah trout streams in spite of the greater than 20% decline (Hepworth and Beckstrom 2004). In each of these three cases, no major change in land management between sampling efforts is known to have occurred in the watersheds. Monitoring efforts at these sites should be repeated in 2016 or prior to any new management activities to determine whether the decline in standing crop is a trend.

Gill net surveys for nonnative trout were completed at 20 lakes across the Forest (Table 9). Average catch rate for nets set hourly was converted to net night rate by multiplying the hourly catch rate by 12. This method overestimates catch rate but provides some measure of what an overnight net set may have produced. Average nonnative trout catch rate from lakes and reservoirs sampled in 2011 is similar to the average catch rate from 2001-2010 (Dixie National Forest 2011). The average percent change for the 11 lakes with prior sampling data available since 2001 was a 50% decline. Overall, 8 of these 11 sites showed a decline greater than the 20% that would cause further evaluation and/or change in management direction as stipulated by the Forest Plan. Two main factors help to account for the change in catch rate at these sites. First, the majority of these lakes and reservoirs do not maintain wild populations of nonnative trout because spawning habitat is not available or because lake conditions periodically become unsuitable for trout (primarily through winterkill). Second, the winter of 2010-2011 was cold with a heavy snowpack, which may have contributed to high rates of winterkill. Data collected in 2011 do not suggest a Forest-wide decline in MIS trout catch rate.

At Bullberry Lakes 1 and 2, stunted brook trout were overpopulated in 2002. The lake was treated to remove these brook trout and replace them with CRCT and tiger trout with the anticipation that the new fishery would produce fewer, but larger fish. Fish collected at Bullberry Lake 2 and 3 in 2011 averaged over 100 mm longer and 0.1 points higher in condition factor than fish collected in 2002. With the exception of Oak Creek Reservoir, catch rates were within the range of previously recorded catch rates at lakes with long-term catch rate data (Lower Bowns, Navajo Lake, Paragonah Reservoir, Pine Lake, and Upper Enterprise Reservoir).

**Table 8. Quantitative stream fish sampling site, Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the stream was sampled, and the percent change in MIS trout standing crop between years. na = not available**

Sampling site	Ranger District	MIS	Standing crop (kg/ha)	Previous sample year	Percent change in standing crop
Left Fork Santa Clara River	Pine Valley	Brown trout	92	2005	-5
Forsyth Creek	Pine Valley	Rainbow trout	63	2004	174
North Fork Pinto Creek	Pine Valley	Rainbow trout	50	2005	-64
Bunker Creek	Cedar City	Brook trout	190	2004	-25
Castle Creek downstream	Cedar City	Brook trout	254	2004	154
Castle Creek upstream	Cedar City	Brook trout	360	2005	-17
Clear Creek	Cedar City	Rainbow trout/ Cutthroat trout/ hybrids	146	na	na
Ipson Creek	Cedar City	Rainbow trout	180	na	na
Left Fork Bunker Creek	Cedar City	Brook trout	295	2004	-1
Red Creek downstream	Cedar City	Brook trout	74	2010	-11
Red Creek upstream	Cedar City	Brook trout	81	2010	29
Right Fork Bunker Creek	Cedar City	Brook trout	297	2004	-30
Seiler Creek	Powell	None	0	na	na
Average			160		20

**Table 9. Lake sampling site, Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the lake was sampled (sampling data from 2001-2010 included), and the percent change in MIS trout catch rate between years. Data provided courtesy of Utah Division of Wildlife Resources. na = not available**

Lake	Ranger District	Species	Catch rate	Previous sample year	% change from previous sample
Blue Lake	Escalante	Brook trout	6	na	na
Bullberry Lake 1	Fremont River	Tiger trout, CRCT	108 <sup>a</sup>	na	na
Bullberry Lake 2	Fremont River	Tiger trout	12	2002	-77
Bullberry Lake 3	Fremont River	Tiger trout, CRCT	19	2002	-93
Bullberry Lake 4	Fremont River	Tiger trout	12	na	na
Coleman Reservoir	Fremont River	Brook trout, rainbow trout	7	na	na
Donkey Reservoir	Fremont River	Brook trout	64	na	na
Heart Lake North	Fremont River	Tiger trout, brook trout	48 <sup>a</sup>	na	na
Heart Lake South	Fremont River	Tiger trout	104 <sup>a</sup>	na	na
Lower Bowns Reservoir	Fremont River	Rainbow trout	10.7	2010	-87
Moosman Reservoir	Escalante	Brook trout	36	na	na
Navajo Lake	Cedar City	Splake, rainbow trout, brook trout	24.3	2008	-80
Oak Creek Reservoir	Fremont River	Brook trout	29	2007	-56
Panguitch Lake	Cedar City	Rainbow trout, cutthroat trout, tiger trout	64.3	2010	14
Paragonah Reservoir	Cedar City	Rainbow trout, tiger trout, brook trout	38.3	2009	-45
Pine Lake	Escalante	Rainbow trout, BCT	8.7	2007	-81
Solitaire Lake	Fremont River	CRCT, Tiger trout	25	na	na
Tropic Reservoir	Powell	Brown trout, rainbow trout, brook trout	12.3	2007	23
Upper Enterprise Reservoir	Pine Valley	Rainbow trout	22.8	2010	-72
Yellow Lake	Escalante	Brook trout	39	2004	5
Average			34.5		-50

## **Interpretation.**

**Is further evaluation needed?** No

**What are the implications?** None

**Conclusion.** While individual streams, lakes, and years may vary in standing crop and catch rate estimates for nonnative trout, Forest-wide nonnative trout populations appear stable and have standing crop and catch rate estimates above average when compared to other southern Utah trout streams.

## **Monitoring Resources Available.**

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

## **Recommendation.**

Continue to work with UDWR to accomplish nonnative trout monitoring objectives, while identifying potential project opportunities to benefit nonnative trout sport fishing populations on the Forest. Continue to coordinate with UDWR regarding species and stocking rates in Forest lakes and reservoirs to maximize sport fishing opportunities.

## **Citations**

Dixie National Forest. 2011. *Dixie National Forest Five Year Land Resource Management Plan Monitoring Report for Fiscal Year 2006-2010*. Cedar City, UT: Dixie National Forest.

Golden, M. 2012. *Dixie National Forest Fish Surveys FY2011*. Cedar City, UT: Dixie National Forest, Supervisor's Office.

Hepworth, D., and S. Beckstrom. 2004. *A simple 4-step method to manage for quality fishing: Implementing Utah's Blue Ribbon Fishery Program*. Salt Lake City, UT: Utah Division of Wildlife Resources, Publication Number 04-24.

## I. Habitat Diversity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Habitat Diversity	Vegetative composition and age class surveys, calculation of Patton Edge-Shape Index from maps & air photos, annually in vegetative manipulation project areas; annual reporting.	M/H	Significant variation from standards and guidelines specifications; below 7% oldgrowth, less than 7% grass, less than 10% other age classes.

### Methods.

The Patton Edge-Shape Index has not been used since the Forest Plan was written. Habitat diversity has been monitored at various scales from the landscape level to the site-specific project level using several different sources. Some of these sources include the review of UDWR long-term range trend data, Forest stand exam data, GAP data, soil surveys, visual reconnaissance, and Forest range trend data. This information has been documented and reviewed from the site-specific level to the planning unit level, and is catalogued in core GIS layers.

### Variation.

The variation that would cause further evaluation and/or change in management direction is a significant variation from standards and guidelines specifications. This consists of edge contrast, and percent of habitats in a variety of structural and age classes (page IV-25-26).

### Results.

In reviewing Forest standards and direction, it was not logistically or economically feasible to assess every project that modified wildlife habitat diversity across the Dixie National Forest.

### Interpretation.

**Is further evaluation needed?** Data are not sufficient to determine.

**What are the implications?** Maintenance of diversity on the National Forest has not been tracked or measured using the above methods.

**Conclusion.** A more efficient method to determine forest conditions with regard to diversity is needed.

### Monitoring Resources Available.

No resources have been allocated to using these tools to determine if diversity is meeting Forest Plan direction. Monitoring resources are available, but have not been used extensively, and include stand exams, aerial photo interpretation, satellite imagery, and Properly Functioning Condition assessments.

## Recommendation.

The 1992 Forest Plan Monitoring Report recommended that the Patton Edge-shape Index should be eliminated as a monitoring tool (Forest Plan amendment). This recommendation is still appropriate.

## Citations

Patton, D.R. 1975. A diversity index for quantifying habitat edge. Wildl. Soc. Bull., 3, pp. 171-173.

## J. Snag Management

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Snag management	Pre-sale, post-sale, post-fire wood count and condition survey for each sale; annual reporting.	H/H	10% below specifications of standards and guidelines.
Is snag habitat (i.e., number and size of snags) being maintained in desired spatial arrangement?	Snag densities and sizes within a 100-acre block treated by mechanical or wildland fire use. Measure 10% or more of the acres treated within a project area, within 2 years following completion of the vegetative treatment; five-year reporting.	NA	Less than 75% of the blocks measured meet guideline requirement.

## Methods.

The assessment of snags has been reviewed at the project-specific level across the Forest. On areas proposed for vegetation treatments, the retention of snags as described in the Forest Plan has been managed. Snag densities have been monitored in correlation with woodpecker occupancy and density. Some of these results have been obtained through cooperative efforts with UDWR and university graduate studies. Vegetation treatment projects are designed to meet Forest Plan standards and guidelines.

## Variation.

The variation causing further evaluation is 10% below specifications of standards and guidelines for snags. The Utah Northern Goshawk Project Amendment states 75% or more of the blocks measured meet guideline requirements as an acceptable range.

## Results.

Data has not been compiled for this report.

## Interpretation.

**Is further evaluation needed?** There are insufficient data to determine if there is a variation causing further evaluation and/or management change.

**What are the implications?** Snags are an important part of healthy ecosystems for soil nutrient recycling (after snags fall to the ground), for providing habitat for a multitude of birds, mammals, reptiles and insects, for providing structure in streams, and micro-site protection for seedling trees and other plants to grow. Without snag information, conclusions about this habitat component are lacking.

**Conclusion.** Data are needed on snag numbers and distribution to determine if standards and guidelines are being met and this important habitat component is being maintained.

#### **Monitoring Resources Available.**

Resources have not been allocated to measure snags other than in stand exam data collected for silvicultural objectives.

#### **Recommendation.**

This item in the Forest Plan has been updated with the Utah Northern Goshawk Project Forest Plan amendment, and should be dropped to avoid repetition. Develop criteria with which to prioritize areas for snag data collection.

### **K. Fish/Riparian Habitat**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring; annual to develop baseline, every 5 years as needed thereafter; reporting as data collected.	H/H	20% variation from specifications of standards and guidelines.

#### **Methods.**

The 2010 Aquatic Amendment specifies that vegetative composition, age class surveys, Dixie water quality monitoring plan, and aquatic MIS habitat surveys per MIS monitoring will be used to assess fish and riparian habitat.

#### **Variation.**

A 20% variance from specifications of standards and guidelines would cause further evaluation or a change in management direction. Standards and guidelines for fish and riparian habitat are outlined in Aquatic Amendment.

#### **Results.**

Insufficient data have been presented to compare management actions or habitat conditions to standards and guidelines in the Forest Plan.

## **Interpretation.**

**Is further evaluation needed?** Insufficient data have been compiled to compare management actions or habitat conditions to standards and guidelines in the Forest Plan.

**What are the implications?** With insufficient data presented, it is difficult to determine conditions of our riparian areas and if the existing standards and guidelines are appropriate.

**Conclusion.** It is imperative to gather appropriate information for supporting conclusions regarding riparian areas on the Forest.

## **Monitoring Resources Available.**

Unknown.

## **Recommendation.**

Continue monitoring.

## **L. Big Game Habitat Effectiveness**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Habitat effectiveness for big game	Annual road density: map, air photo; annual reporting.	M/M	10% below specifications of standards and guidelines
	Hiding, thermal cover; ground survey each timber sale. Reported annually	H/H	10-15% variation from specifications of standards and guidelines

## **Methods.**

Assessment of annual road density and hiding and thermal cover.

## **Variation.**

A variation 10% below specifications of standards and guidelines would indicate a need for further evaluation and/or management direction in road density. The guideline that relates to big game habitat effectiveness is on page IV-50, specifying that road densities should not exceed two miles per square mile of wildlife habitat. A variation 10-15% below specifications of standards and guidelines would indicate a need for further evaluation and/or management direction in hiding and thermal cover. The standards and guidelines that relate to these components of habitat effectiveness are on page IV-34; big game hiding cover is defined as that needed to hide 90% of a standing deer or elk at a distance of at least 200 feet.

## **Results.**

OMRD was analyzed across the Forest for the 2009 Motorized Travel Plan (MTP) EIS.

**Table 10. Open Motorized Road Density (OMRD) by alternative for mule deer Wildlife Management Units (WMU) within the planning area.**



WMU	Existing	MTP
Boulder Plateau	1.24	0.80
Kaiparowitz	1.66	0.69
Mt. Dutton	1.32	0.74
Panguitch Lake	2.15	1.53
Paunsaugunt	3.01	1.58
Pine Valley	1.05	0.76
Zion	2.67	2.54

**Table 11. Open Motorized Road Density (OMRD) by alternative for Rocky Mountain elk Wildlife Management Units (WMU) within the planning area.**

WMU	Existing	MTP
Boulder Plateau	1.31	0.86
Kaiparowitz	1.67	0.71
Mt. Dutton	1.37	0.76
Panguitch Lake	2.07	1.44
Paunsaugunt	3.38	1.76
Zion	1.61	1.53

Data for hiding and thermal cover has not been compiled for this report, but is analyzed on a project-specific basis.

### **Interpretation.**

**Is further evaluation needed?** Unknown. Data for hiding and thermal cover has not been compiled for this report. The Forest Plan guideline states that road densities over 2.0 miles per square mile decrease habitat effectiveness. As MTP is implemented, OMRD will decrease on all units except Zion to densities below the guideline.

**What are the implications?** Road densities are calculated and displayed in each project analysis. Sufficient GIS capabilities exist for this analysis. Hiding cover is analyzed on a project-specific basis.

**Conclusion.** The variation causing further evaluation is road densities are 10% *below* the two miles per square mile standard and guideline. The intent for the guideline is that higher habitat effectiveness is desired and higher road densities decrease habitat effectiveness. Therefore, the variation should be written as 10% *above* guidelines.

Using open road densities for this calculation would be more meaningful for assessing big game habitat effectiveness. Roads themselves do not normally decrease habitat effectiveness; it is the use by motorized vehicles that causes a decrease in habitat effectiveness. Therefore, open road density is a good measure of habitat effectiveness for big game species.

### **Monitoring Resources Available.**

Vegetation data at the project level has been collected, analyzed, and reviewed for big game habitat effectiveness. GIS systems calculate road mileage and acreages.

### Recommendation.

Retain open road density as a measure of habitat effectiveness for big game (change “road density” to “open road density” with a Forest Plan amendment). Change the variation to read 10% *above* open road density specifications. Specify as a guideline. Prioritize areas to evaluate road density. Eliminate thermal cover from monitoring and requirements from the standards and guidelines.

## M. Occupied Goshawk Territories

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are known goshawk territories on national forests remaining occupied?	Goshawk territory occupancy at the Forest Level annually, reported every 3 years.	NA	Less than 20% decline in territory occupancy over a 3 year period is acceptable range.

See C. Northern Goshawk, above on page 8-34.

## N. Goshawk Mitigation Measures

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?	Goshawk territory occupancy following vegetative management treatments. Monitor the first full breeding period following activity in all projects where pre-project surveys determined territory occupancy; annual reporting.	NA	Any territory abandonment on projects where mitigation measures are used.

### Methods.

Monitor goshawk territory occupancy following vegetative management treatments. Monitor the first full breeding period following activity in all projects where pre-project surveys determined territory occupancy.

### Variation.

Any goshawk territory abandonment on projects where mitigation measures were used. Territory abandonment occurs when nesting has been initiated and the birds leave the area and do not continue nesting.

**Results.**

Insufficient data were presented.

**Interpretation.**

**Is further evaluation needed?** Insufficient data were presented.

**What are the implications?** Mitigation measures cannot be evaluated for their effectiveness, and adapted to meet future needs, if they are not monitored.

**Conclusion.** No conclusions can be drawn.

**Monitoring Resources Available.**

Unknown.

**Recommendation.**

Determine projects where mitigation measures were used, and prioritize those projects for monitoring.

**O. Goshawk Habitat Connectivity**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Is habitat connectivity, as represented by structural and species diversity and dispersion thereof, within and among 5th to 6th order watersheds (or equivalent ecological scale) being maintained?	Spatial dispersion and patch size of mature and old forest groups within a 5th to 6th order watershed. Tree species composition mix within mature and old groups within a landscape. At the completion of each landscape assessment. Five-year reporting.	NA	Less than approximately 40% of the coniferous and/or 30% of the aspen forested acres within a landscape in VSS 5 and 6 classes. Seral species characteristic of the cover type are not well-represented in VSS 5 and 6 classes.

**Methods.**

Evaluate spatial dispersion and patch size of mature and old forest groups within a 5th to 6th order watersheds.

**Variation.**

Approximately 40% of the coniferous and/or 30% of the aspen forested acres within a landscape in VSS<sup>6</sup> 5 and 6 classes is an acceptable range.

**Results.**

No results were presented.

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<sup>6</sup> VSS = Vegetative Structural Stages as defined in Reynolds et al. 1992.

**Interpretation.**

**Is further evaluation needed?** Insufficient data were presented.

**What are the implications?** None can be determined at this time.

**Conclusion.** No conclusions were drawn at this time.

**Monitoring Resources Available.**

Unknown.

**Recommendation.**

Prioritize areas for which an analysis will be conducted to determine VSS classes.

**P. Snag Habitat**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Is snag habitat (i.e., number and size of snags) being maintained desired spatial arrangement?	Snag densities and sizes within a 100-acre block treated by mechanical or wildland fire use.	N/A	75% of more of the blocks measured meet guideline requirements is the acceptable range.

See H. Snag Management, on page 8-52, above.

**Q. Down Woody Material**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are down woody material and logs being maintained in sufficient amounts, sizes and spatial locations?	Down log and woody debris amounts and sizes within a 10-acre block treated by mechanical or wildland fire use. Measure 5% of more of the acres treated within a project area, within 2 years following completion of the vegetative treatment. Five-year reporting.	NA	Less than 75% of the blocks measured meet guideline requirements.

**Methods.**

Collection of down log and woody debris amounts and sizes within a 10-acre blocks treated by mechanical or wildland fire use.

**Variation.**

Seventy-five percent or more of the acres treated within a project area meeting guidelines, within 2 years following completion of the vegetative treatment, is the acceptable range.

**Results.**

No results were presented.

**Interpretation.**

**Is further evaluation needed?** Insufficient data were presented.

**What are the implications?** It is unknown whether down woody material and logs are being maintained to meet guidelines.

**Conclusion.** No conclusions were drawn.

**Monitoring Resources Available.**

Unknown.

**Recommendation.**

Identify acres treated and/or planned for treatment and schedule monitoring.

## R. Goshawk Habitat – Grazing Adjustments

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are appropriate adjustments made to grazing practices in identified “at-risk” locations where grazing is contributing to the “at-risk” condition?	Ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified “at-risk” locations. Review grazing practices annually on at least 2 allotments where “at-risk” conditions have been identified; five-year reporting.	NA	Grass, forb, and shrub production objectives are outside the range identified in landscape assessments.

**Methods.**

Ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified “at-risk” locations. Review grazing practices annually on at least 2 allotments where “at-risk” conditions have been identified.

**Variation.**

Grass, forb, and shrub production objectives are within the range identified in landscape assessments is the acceptable range.

**Results.**

No results were presented.

**Interpretation.**

**Is further evaluation needed?** Insufficient data were presented.

**What are the implications?** At risk allotments are not known, and adjustments may not be occurring to grazing practices in at risk allotments.

**Conclusion.** No conclusions were drawn.

**Monitoring Resources Available.**

Unknown.

**Recommendation.**

Identify “at risk” allotments and schedule monitoring.

**Figure 4.** Goshawks, such as this one, are monitored annually on the Forest.



## SECTION 9. RANGE

### A. Range Vegetation Condition and Trend

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Range Vegetation Condition and Trend	Measurement of plant composition and vigor, ground cover and soil stability. Monitoring and reporting frequency as per approved allotment management plan <sup>7</sup> .	M/M	Downward vegetation and/or soil trend.

#### Methods.

Successional status and percent ground cover were evaluated on the Forest as indicators for range vegetation condition and trend. 185 sites were visited in 2011 using the following reference methods:

- FSH 2209.21 – Rangeland Ecosystem Analysis and Monitoring Handbook – Chapter 40 – Rangeland Trend Monitoring (R4 Amendment 2209.21-2005-2 : Effective Date 12/23/2005)
- Chapter 20 – Rangeland Analysis (R4 Amendment 2209.21-2005-2: Effective Date 12/23/2005).
- Chapter 20 – Rangeland Analysis (Dixie NF Supplement No: 2209.21-2010-1: Effective Date: February 25, 2010) - Amends effective ground cover guidelines for the Dixie NF.
- Ocular Macroplot: USDA Forest Service Ocular Macroplot Field Guide (September 2008)
- With additional clarification provided in: Terrestrial Ecological Unit Inventory (TEUI) Guide (USDA, Forest Service General Technical Report WO-68).

#### Variation.

Variation that would cause further evaluation and/or change in management direction would be a “downward vegetation and/or soil trend”.

#### Results.

During 2011, 185 long-term trend monitoring studies were completed on the Dixie National Forest. 124 were upland range trend monitoring studies, 49 were Level III Riparian Inventories, and 12 were photo points completed by Forest personnel.

These monitoring studies were performed in 58 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. People on this crew

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<sup>7</sup> See discussion under “Methods” for update on methods and frequency.

included Mark Madsen (Forest Botanist), and John Perez (Biological Science Technician). These monitoring studies were accomplished during the 2011 field season from April 1 – November 1.

111 of 124 FS upland range trend monitoring sites (90%) were replicated studies from which accurate trend data can be derived. 28 of 49 of the FS Level III Riparian Inventories (57%) were replicated and have accurate trend available. None of the 12 photo points have trend available at this time.

Of the 111 replicated upland range trend monitoring studies, the data analysis on 25 of them (23%) indicate a downward trend in vegetation condition, effective ground cover, and/or frequency of invasives. The other 86 sites (77%) demonstrated stable or upward trends. 8 of the 25 monitoring sites (32%) that indicate downward trends are located in areas of the Dixie National Forest that have burned (wildfire or prescribed fire) or been mechanically treated within the past ten years. These burned and mechanical treatment areas are highly susceptible to cheatgrass invasion and low effective ground covers resulting from reduced fuel loads. There are a total of 4 of 111 sites (4% of all upland trend studies re-read in 2011) where downward trends may be a result of mechanical or prescribed burn project-level management activities not influenced by uncontrolled wildfire. These 4 monitoring sites are located on 3 pastures of the Pine Valley, Powell, and Escalante Ranger Districts. In summary, 21 monitoring sites of 111 sites (19% of all upland trend studies re-read in 2011) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. Further evaluation of these 21 sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 28 replicated Level III Riparian Inventories, the data analysis on 4 of them (14%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. These occur on 4 pastures of the Pine Valley, Cedar City, and Escalante Ranger Districts. The Corn Creek wildfire of 2008 burned up the site on the Escalante RD. Therefore, the monitoring site located on the Escalante Ranger District was negatively impacted by wildfire. Further evaluation of the other three sites may be warranted to determine if a change in management direction is needed and able to improve them. A total of 24 of the replicated Level III Riparian Inventories (86%) demonstrate a stable or upward trend since they were last read in 2006.

In 1986, the Forest Plan did not define vegetation, ground cover, and soil stability conditions that would serve as a baseline from which to measure. Therefore, there are no reference conditions (from 1986) from which to measure trend. Since there is no baseline, sole reliance is placed on measuring trend during a defined time frame, from one long-term trend study reading to another. Therefore, using trend as variation that would cause further evaluation would be appropriate. Of the 185 monitoring studies and photo points reported here, 139 (75%) had previously established baseline studies using current methodologies where accurate trend data or photo interpretation could be derived. Other study sites may have previous readings, but this data was collected using various methods which are not compatible with current measurements and/or locations and photos could not be replicated. In the absence of periodically recorded post-1986 data, we cannot project a clear picture of how much the range has improved or declined over 1986 levels on the Dixie National Forest. However, current trend re-read from 2000-2006 does give a clear picture of trend on the Forest between then and 2011. Of the 139 sites re-read and evaluated in 2011, 29 (21%)



exhibited downward trends since these sites were last read between and inclusive of the years 2000-2006.

The Forest has established a long-term monitoring program, as indicated by the number of studies re-read or established during 2011 and in previous years (669 FS upland range trend monitoring studies, 224 Riparian Level III Inventories, and 183 photo points from 2004-2011). Over time, these studies will be repeated and trend data will become available. This data is stored in a retrievable database where it can be accessed and additional repeat studies can also be stored and compared.

*Successional Status:* The Forest Plan requires the Forest to maintain riparian areas at  $\geq 60\%$  of potential for management level 3 riparian areas. Potential for late seral community types is defined by % gradient and substrate classes (Dixie NF LRMP IV-41 amended 9/95; revised 3/96). In a sample of 49 riparian sites across the Forest during 2011, 33 of the sampled riparian areas (67%) are maintained at 60% of potential or above as required in the Forest Plan for management level 3 riparian areas. 16 riparian sites or 33% are not being maintained at 60% of potential as required by the Forest Plan. 2 of these 16 riparian sites not meeting Forest Plan requirements are on the Powell and Escalante Ranger Districts and are the direct result of the Sanford and Corn Creek wildfires burning through these areas in 2002 and 2008, respectively. These riparian areas have not yet recovered from these large wildfires. Therefore, there are a total of 14 monitoring sites of 49 (29% of all Level III Riparian Inventories performed in 2011) where downward trends may be a result of management activities not influenced by uncontrolled wildfire. The riparian areas that are not meeting Forest Plan standards and guidelines are located on the Pine Valley, Cedar City, Powell, Escalante, and Teasdale Ranger Districts of the Dixie National Forest. Therefore, further evaluation of these 14 riparian sites may be warranted to determine if a change in management direction is needed and able to improve them.

*Percent Ground Cover:* Forest Plan standards and guidelines specific to Management Areas 4A, 9A, and 9B for ground cover in riparian areas (Management Area 4A direction – standard and guideline 4B – pg. IV-79, Management Area 9A direction - standard and guideline 3B – pg. IV-141, and Management Area 9B direction – standard and guideline 3B – pg. IV-150) require that the Forest: “Maintain at least 80 percent of potential ground cover within 100 feet from the edges of all perennial streams, lakes, and other water bodies, or to the outer margin of the riparian ecosystem, where wider than 100 feet.” Since no potential ground covers have been defined for riparian areas on the Dixie National Forest, for the purpose of this analysis, potential is assumed to be 100 percent for all riparian areas. Out of the 49 Level III Riparian Inventories sampled on the Dixie National Forest in 2011, 18 fell within Management Area 9A. Of these 18 studies, 3 study sites, or 17%, had ground covers of less than 80% along the green-line. These 3 study sites not meeting Forest Plan standards and guidelines for ground cover in special management area riparian systems occur on Cedar City Ranger District. Percent ground cover on these 3 sites not meeting the standard may need to be evaluated to determine if a change in management is needed and able to improve them.

### **Interpretation.**

**Is further evaluation needed?** Yes, both downward and upward range vegetation condition and trends are apparent on the Forest.

**What are the implications?** For upland sites re-read in 2011, 21 monitoring sites of 111 sites (19% of all upland trend studies) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. Further evaluation of these 21 sites may be warranted to determine if a change in management direction is needed and able to improve them.

For riparian sites re-read in 2011, 4 of them (14%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. These occur on 4 pastures of the Pine Valley, Cedar City, and Escalante Ranger Districts. The Corn Creek wildfire of 2008 burned up the site on the Escalante RD. Therefore, the monitoring site located on the Escalante Ranger District was negatively impacted by wildfire. Further evaluation of the other three sites may be warranted to determine if a change in management direction is needed and able to improve them.

**Conclusion.** Areas in downward upland and riparian range condition trend should be sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

#### **Monitoring Resources Available.**

Yes. This monitoring is the responsibility of the Dixie NF Botanist and long-term vegetation monitoring crew.

#### **Recommendation.**

Continue to monitor range vegetation condition and trend annually.

### **B. Forage and Grazing Utilization**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Forage utilization	Grazing impact studies by standard Forest Service methods. Reporting and monitoring frequency as per approved allotment management plan	M/M	Exceed prescribed utilization by 20% one time or 10% consistently.

#### **Methods.**

The 1986 measurement frequency requirement was “as per direction in approved AMPs”. The Forest Plan monitoring method is “grazing impact studies by standard Forest Service methods”. In 1992, the methodology was changed to “utilization studies”. Utilization (percent of forage removed) was retained for measuring use in uplands as well as browse species in both uplands and riparian areas.

## **Variation.**

Exceed prescribed utilization by 20% one time or 10% consistently.

## **Results.**

During the 2011 grazing season, 43 of 76 allotments (57%) were reported to have been monitored for compliance with Forest forage utilization standards. A total of 120 pastures were monitored within the 43 allotments. Of the 120 pastures monitored, 117 (98%) were in compliance with the Forest Plan. There were a total of 150 compliance monitoring events reported, 53 (35%) in riparian areas and 99 (65%) in upland sites. In both the riparian and upland sites, 98% of the monitoring events found compliance with Forest standards had occurred. Stubble height, height/weight method, key species method, ocular reconnaissance, and photo documentation were the primary methods used for assessing utilization compliance.

Of the four allotments monitored on the Pine Valley Ranger District, one did not meet standards. Riparian stubble height was exceeded by more than 20% in the Little Pinto Creek Pasture on the East Pinto Allotment.

All 22 allotments on the Cedar City Ranger District stayed within utilization standards.

Seven allotments on the Powell Ranger District were monitored in 2011. All monitored pastures were within Forest utilization standards.

Nine allotments were monitored on the Escalante Ranger District. Over-utilization was found in certain portions of the Holby Bottom Pasture on the North Creek Allotment and in the Pine Creek/Roger Peak Pasture on the Pine Creek Allotment. Neither of these was exceeded by more than 20% and standards have not continually been exceeded in these areas.

Across the Forest, utilization standards were met on 93% of the allotments monitored.

## **Interpretation.**

**Is further evaluation needed?** Further evaluation is needed in the Little Pinto Creek Pasture because utilization standards were exceeded by more than 20%. Further evaluation is not needed on the Pine Creek or North Creek Allotments because utilization standards were exceeded by less than 20% and have not been consistently exceeded by more than 10%.

**What are the implications?** General satisfactory rangeland conditions indicate that stocking levels are fairly consistent with established capacities. However, some areas may be used to excessive levels. In most cases, this is a management problem rather than a capacity problem. Most often the excess use occurs because livestock enter an area too early because of poorly maintained fences, stay too long because permittees fail to make a complete gather, or return after being removed because of poorly maintained fences.

**Conclusion.** There are no indications that, at a landscape scale, livestock stocking rates are 10% or more in excess of prescribed utilization levels, which would require further evaluation and/or change in management direction.

### **Monitoring Resources Available.**

In the past 20 years, inflation, static range budgets, and escalation in support and overhead costs, coupled with ever-increasing legal and environmental documentation requirements, have continued to erode away the Forest's ability to provide efficient and effective administration of livestock grazing and rangeland resources. The direct result of insufficient staffing is a lack of accomplishment in all facets of the range program. For the last several years, program emphasis has been placed on permit administration as the number one priority.

### **Recommendation.**

Continue monitoring.

## **C. Wild Horse Numbers and Trend**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Wild Horse Numbers and Habitat Trends	Annual aerial horse counts, grazing impact studies, habitat assessment as per allotment management plans; annual reporting.	M/M	Horse numbers deviate by 10% or range trend is down.

### **Methods.**

Annual aerial horse counts.

### **Variation.**

Horse numbers deviate by 10% or range trend is down.

### **Results.**

The North Hills Wild Horse Territory (WHT) and Herd Management Area (HMA) management plan, dated May 1977, charges the Forest Service and the Bureau of Land Management (BLM) to jointly manage the WHT/HMA at 40-60 horses. This area is approximately 71,000 acres, comprised of 50% Bureau of Land Management, 35% the Forest, 8% State land, and 7% Private. Wild horses also solely use an additional 7,000 acres that are not part of the designated WHT.

In December 2010, the BLM conducted a gather and removed 99 animals from BLM lands. Part of the gather was a census count on BLM, FS, and other lands. Population counts found 22 animals on BLM, 18 on FS, and 16 outside of BLM/FS HMA.

These numbers are within the existing Appropriate Management Level (AML) for the unit.

Five long-term monitoring sites are in the territory; three locations were rated as functioning, one rated as functioning-at-risk, and the final non-functioning. Causes for functioning-at-risk and non-functioning were due to high presence of cheatgrass and low ground cover. Annual utilization was estimated at 75% in uplands and 95% in riparian.

**Interpretation.**

**Is further evaluation needed?** Yes, aerial counts and adjusted estimates indicate that populations fluctuate more than 10% annually. Past monitoring has indicated that there are wide fluctuations in population numbers because of annual mortality and colt survival. Reproductive rates vary between 15% and 20%. Utilization levels are being exceeded and rangeland conditions could improve in some areas.

**What are the implications?** As of 2011, wild horse numbers are at the minimum AML of 18. However, herd numbers fluctuate widely and are generally in excess of the prescribed numbers. The additional 16 horses located in areas outside the WHT/HMA should be removed. Routine removals have generally fallen short of maintaining the herd within the AML.

**Conclusion.** Monitoring does not indicate a need to change management direction.

**Monitoring Resources Available.**

The Forest is in a cooperative program with BLM to achieve this monitoring.

**Recommendation.**

Continue to cooperate and coordinate with the BLM in managing wild horse numbers in both the North Hills Wild Horse Territory and the BLM's adjacent North Hills Herd Management Area (HMA).

The variation causing further evaluation is wild horse populations fluctuating more than the 10% from that prescribed by the Forest Plan. Review this monitoring for possible Forest Plan amendment to better reflect accepted population changes.

## SECTION 10. TIMBER

### A. Timber Harvest Area

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber Harvest Area	Semi-annual review and reporting of timber program to ensure that harvest area will not exceed 10-year estimate by more than 10%	H/M	Planned harvest area exceeded by more than 10% in any given year.

#### Methods.

Evaluation of timber harvest areas.

#### Variation.

Harvest areas exceed more than 10% in any given year. The Forest Plan projected average is 10,525 acres per year.

#### Results.

Acres harvested are monitored annually and compared with the Forest Plan projected average of 10,525 acres per year. 3,806 acres were sold in 2011. Annual data are shown on Table 12.

**Table 12. Acres in timber sales sold and harvested from 1987 to 2011 on the Dixie National Forest.**

Year	Total Acres in Sales Sold 1987-2011	Total Acres Harvested in Sales Sold in 1987-2011
1987	5,656	84
1988	5,369	2,946
1989	7,193	3,590
1990	5,184	7,454
1991	7,403	5,029
1992	2,907	6,629
1993	4,366	4,962
1994	2,044	3,807
1995	822	1,411
1996	11,762	4,068
1997	5,131	6,600
1998	4,092	3,743
1999	2,695	3,332
2000	1,553	6,196
2001	536	1,173
2002	804	990
2003	449	856
2004	2,266	144
2005	1,500	539
2006	230	723
2007	4,604	1354

<b>Year</b>	<b>Total Acres in Sales Sold 1987-2011</b>	<b>Total Acres Harvested in Sales Sold in 1987-2011</b>
2008	1,191	1124
2009	616	318
2010	709	200
2011	3,806	885

**Interpretation.**

**Is further evaluation needed?** No, harvested acres have not exceeded the projected decadal average stated in the Forest Plan.

**What are the implications?** Impacts from timber harvest and outputs are less than projected in the Forest Plan.

**Conclusion.** There is no variation that would cause further evaluation and/or change in management direction.

**Monitoring Resources Available.**

The sold and harvest acres are taken from the Timber Information Manager (TIM), Forest Service Activity Tracking System (FACTS), and Cut and Sold Report from TSA.

**Recommendation.**

Continue monitoring volume and acres as harvested.

The Forest Plan states the monitoring method as, "Review of timber program to ensure that harvest area will not exceed 10-year estimate by more than 10%". The variation causing further evaluation and/or change in management direction is, "Planned harvest area exceeded by more than 10% in any given year". These two measures are not consistent: one states a 10-year estimate and the other is in any given year. A Forest Plan amendment is needed to make these items consistent.

**Figure 5. Aspen communities have been encroached by Engelmann spruce, subalpine fir, and white fir. Most of the spruce trees have been killed across the Markagunt Plateau from a spruce beetle epidemic.**





## B. Timber Research Needs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber Research Needs	Annually document and report recurring or unusual problems	M/M	Inability to solve problems though existing technology or practices.

### Methods.

#### Englemann spruce beetles

Long-term monitoring for spruce beetles (*Dendroctonus rufipennis*) continues across the Forest and specifically on the Griffin Top area of the Aquarius Plateau on the Escalante Ranger District. These studies are designed to determine infestation levels in uninfested harvested and non-harvested areas. These studies are conducted by the Dixie National Forest and R4 Forest Pest Management (FPM).

#### Root disease

The Forest, in conjunction with FPM, has been looking at timber harvest and slash treatment methods to control the spread of Tomentosus root rot (*Inonotus tomentosus*) in Engelmann spruce and blue spruce. This disease has been detected by pathologists in several stands of blue spruce on the Aquarius Plateau.

### Variation.

Inability to solve problems though existing technology or practices.

### Results.

Research is ongoing. For long-term monitoring of spruce beetles on the Griffin Top, studies are indicating that while spruce beetle caused mortality has decreased on the Plateau, many stands are still at high to moderate susceptibility, and are of concern because spruce beetles are capable of long distance dispersal, and with the general depletion of host resources on Griffin Top, populations may begin to spread north and east (Hebertson 2010). One conclusion so far is that prevention strategies, including silvicultural treatments such as thinning and group selection, offer the greatest chance of reducing long-term susceptibility to spruce beetle infestation because they increase diversity of species and structure across the landscape. If silvicultural treatments are used, they must occur while spruce beetle populations are at low levels to maximize their effectiveness (Hebertson 2010). Spruce beetle monitoring will continue in this area.

For monitoring of Tomentosus root rot spread, recommendations have been root disease in several stands in the Row Lakes project area. Although only blue spruce trees were infected, this root disease is known to infect all spruce species throughout south-central Utah. Harvesting, particularly partial cutting, could intensify the root disease and potentially affect residual spruce or spruce regeneration. Recommendations are to minimize partial cutting in those portions of stands where Tomentosus root disease is prevalent or favor disease tolerant species such as aspen or Douglas-fir where possible (Hebertson 2010).

## Interpretation.

**Is further evaluation needed?** The results are not yet complete.

**What are the implications?** Results in prioritizing treatments in Englemann spruce stands that are at moderate to high susceptibility of beetle infestation. Also, the results will focus treatments to control the spread of *Tomentosus* root rot.

**Conclusion.** There is no variation that would cause further evaluation and/or change in management direction at this time.

## Monitoring Resources Available.

Research Stations and Forest Pest Management conduct research projects.

## Recommendation.

Continue to use research to study Forest problem.

The wording in the variation is out of place and should be changed to read “Inability to solve problems through existing technology or practices” (Forest Plan amendment).

## Citations.

Hebertson, L. 2010. FHP Functional Assistance Visit to the East Zone of the Dixie National Forest, OFO-TR-10-16, 2010.

## C. Suitable and Unsuitable Land Classifications

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Verify Classification of Suitable and Unsuitable lands	Examine lands during silvicultural exams, timber inventories, and ID team reviews to ground truth capabilities on a project basis; report annually.	H/H	10% of land area found to be incorrectly identified.
	On a project basis as available, but prior to Plan update, complete soil/geologic survey of lands identified as unsuitable because of potential irreversible resource damage by 1990; report every 5 years.	M/H	

## Methods.

A process was developed to verify suitability during timber sale project planning, and to accomplish the classification on the earlier sales made since 1986.

## Variation.

10% of land area found to be incorrectly identified. The Forest Plan identified 300,100 acres of suitable forest land.

## Results.

Table 13 displays the number of timber sales and total acres verified for timber suitability. The total forest acres verified for suitability equals 269,035.

**Table 13. Number of timber sales and acres verified for timber suitability from 1987 to 2011.**

District	Number of Sales	Total Acres Verified
Cedar City	44	119,964
Escalante	23	95,362
Powell	6	28,204
Teasdale	14	25,505
TOTAL	87	269,305

## Interpretation.

**Is further evaluation needed?** Data are not available to determine. Project level suitability classification is progressing. The acres verified are less than was identified in the Forest Plan as suitable forest land (page II-28).

**What are the implications?** A comparison with the suitability classification shown in the Forest Plan will not be possible until the classification program is completed. The resulting classification data will be used in the revision of the Forest Plan.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified at this time.

## Monitoring Resources Available.

District personnel are conducting the project-level suitability classification on a project-by-project basis.

## Recommendation.

Continue project-level classification process.

## D. Harvest Practices in Retention/Partial Retention

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Harvest Practices in Retention, Partial Retention, and Riparian Areas	Review of silvicultural prescriptions for timber sales and post-sale stand exams on a project basis; report annually.	M/H	Violation of Visual Quality Objectives or riparian area damage.

## Methods.

Evaluation of harvest practices in retention, partial retention, and riparian areas.

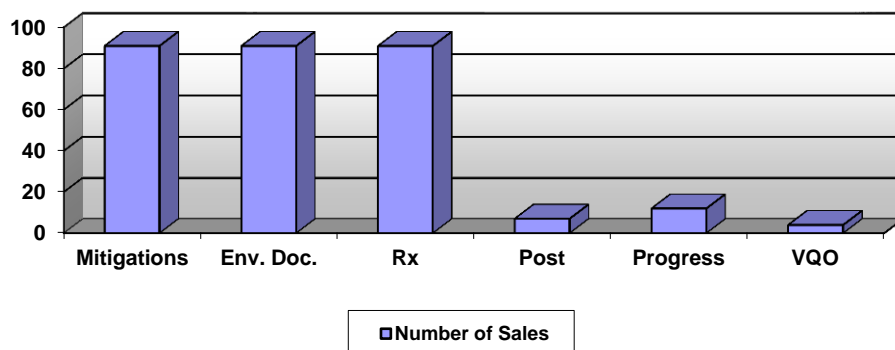
## Variation.

Violation of Visual Quality Objectives (VQOs) or riparian area damage.

## Results.

Of 143 timber sales planned and implemented from 1987 to 2011, 52 had no mitigations identified in the landscape architect report. Of the remaining 91 sales for which mitigations were recommended, all contained the mitigations in the environmental document and in the silvicultural prescription. Of these sales, seven have documentation of post-sale monitoring completed by a landscape architect, and twelve sales are still in progress. The remaining 72 sales have no documentation of post-sale monitoring. On three sales, the VQOs were not met in the first Forest Plan decade (1987-1998) because bark beetle suppression objectives took priority over full accomplishment of VQO. Post-harvest monitoring has not been occurring or documented since before 2006.

**Figure 6. Number of sales on the Dixie National Forest that contained mitigations recommended in the landscape architect report (“mitigations”), mitigations in the Environmental Document (“Env. Doc.”), in the silvicultural prescription (Rx), documented post-sale monitoring (“Post”), sales still in progress (“Progress”), and where Visual Quality Objectives were documented as accomplished (“VQO”).**



VQOs were documented as met on four completed sales (4%) of those with mitigation measures identified in the landscape architect report. There is no documentation to determine if VQOs were accomplished on the remaining 96% of the completed sales for which mitigation measures were identified.

Riparian areas ranging from isolated springs to streams and ponds were present on 28 of the reviewed sales. Twenty-six sales included the riparian areas in the final layout. The Hydrologist’s recommendations were tracked through the EA, silvicultural prescription, marking guidelines and contract/sale area map in the documents. A review of Silvicultural Prescriptions suggests that existing timber sale contract provisions, when fully implemented with a map, are adequate to protect and maintain riparian areas in their existing condition. No riparian area damage was observed.

During project planning, specific restrictions (buffer zones) or special harvesting practices intended to protect riparian areas were identified. Most of these were carried into the Environmental Assessment (EA) as stated in the report. Recommendations were based on informal field visits. Several projects contain general recommendations such as “protect riparian areas.” Most of these recommendations were included in the EA.

Twenty-one of twenty-six sale area maps showed the riparian areas identified by the Hydrologist. Eighteen of these showed all of the riparian areas identified. The riparian areas appear to have been adequately protected in 18 sale areas that were reviewed on the ground.

### **Interpretation.**

**Is further evaluation needed?** Yes, mitigation measures necessary to reduce management impacts on the visual landscape were minimal for most silviculture prescriptions. The Forest Landscape Architect, sale preparation and marking crews, and sale administrator implemented some of the mitigations. Overall, visual quality standards in the Landscape Management Report are being carried through the sale implementation process and accomplished on the ground. A review of Silvicultural Prescriptions suggests that existing timber sale contract provisions, when fully implemented with a map, are adequate to protect and maintain riparian areas in their existing condition.

**What are the implications?** Documentation is needed to determine if achieving Visual Quality Objectives is occurring. Riparian areas appear to be adequately protected and maintained.

**Conclusion.** Overall, specific visuals protection measures are being documented in environmental analysis and silviculture prescription and are documented in only a few sales through post sale monitoring, and none since 2006. There is a need for more consistent post-sale monitoring. No variation that would cause further evaluation and/or change in management direction has been identified for riparian area damage.

### **Monitoring Resources Available.**

The resources are available for planning, but do not appear to be available for post-sale monitoring. The District Hydrologist, silviculturist, and timber sale administrator to ensure that riparian objectives and mitigation measures are met as prescribed conducts monitoring.

### **Recommendation.**

Continue to monitor sales and improve the accuracy of the Landscape Management Reports. Change “Variation” standard to “Deviation from Visual Quality Objectives” (Forest Plan amendment). Update this monitoring to include use of Scenery Management System rather than Visual Quality Objectives.

Continue monitoring silvicultural prescriptions and project areas for protection of riparian areas. Use the timber sale National Environmental Policy Act (NEPA) process to evaluate riparian area condition, where appropriate to the project analysis. Coordinate the broad watershed and riparian inventory with baseline data collection for individual timber sale planning, using the seasonal crew proposed in “BMP<sup>8</sup> Effectiveness” monitoring.

Continue to strengthen the link between the Environmental Assessment and Impact Statements (EA and EIS) through timber sale administration. Ensure that riparian recommendations in the project decision are incorporated into marking guidelines and timber sale contracts. Where site-specific guidelines for harvesting activities in riparian areas are identified, use the sale area map and appropriate contract provisions.

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<sup>8</sup> Best Management Practices.

## E. Adequate Restocking

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Adequate stocking of stands within a reasonable time period, generally 5 years of final harvest.	Silvicultural exam (Type 3), five years after final harvest; report annually.	H/H	Less than 5th year stocking standards in FSH 2409.26b—5.31-4.

### Methods.

Code of Federal Regulations 36 CFR 219.27(c)(3) states, “When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exist to adequately restock the lands within five years after final harvest... Five years after final harvest means five years after clearcutting, five years after final overstory removal in shelterwood cutting, five years after the seed tree removal cut in seed tree cutting, or five years after selection cutting.”

### Variation.

Less than 5th year stocking standards in FSH 2409.26b—5.31-4.

### Results.

Acres in the various “Final Harvest” silvicultural treatments for sales made during 1987-2011 are shown on Table 14. Intermediate treatments such as commercial thinning, shelterwood preparatory cut and seed cut, initial seed tree cut, or sanitation and salvage are not included in Table 14.

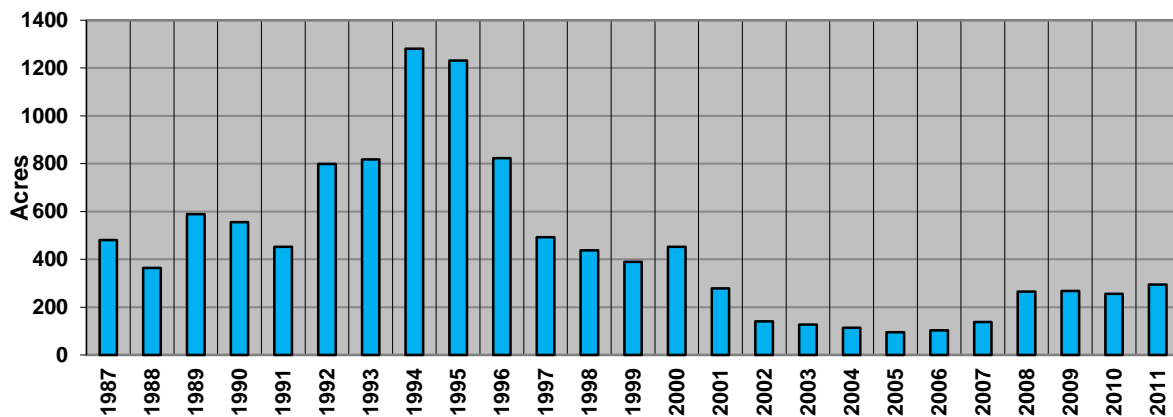
**Table 14. Acres harvested with silvicultural treatments from 1987 to 2011 on the Dixie National Forest.**

Year	Clearcutting	Final Overstory/ Shelterwood	Seed Tree Cutting	Selection Cutting	Total
1987	0	0	0	0	0
1988	0	0	0	0	0
1989	26	57	0	543	626
1990	0	251	0	433	684
1991	0	0	0	1642	1,642
1992	107	0	0	62	169
1993	14	1150	0	3392	4,556
1994	43	0	0	126	169
1995	34	0	0	0	34
1996	26	0	0		26
1997	0	0	0	0	0
1998	0	0	0	0	0
1999	148	0	0	175	323
2000	0	0	0	0	0
2001	0	0	0	0	0
2002	67	0	0	0	67
2003	97	0	0	0	0

Year	Clearcutting	Final Overstory/ Shelterwood	Seed Tree Cutting	Selection Cutting	Total
2004	63	0	0	0	0
2005	0	0	0	0	0
2006	190	0	0	0	0
2007	0	0	0	0	0
2008	110	0	0	243	0
2009	4	0	0	0	0
2010	36	0	0	0	0
2011	0	0	0	0	0

Figure 7 displays the number of acres planted per year from 1987 to 2011. Table 15 provides the 1<sup>st</sup> and 3<sup>rd</sup> year survival records for artificial regeneration (planting) that has occurred between 1987-2011. Because some of these planted acres did not fall into the silvicultural treatment categories listed above, the acre totals will not match.

**Figure 7. Acres planted annually on the Dixie National Forest from 1987 to 2011.**



**Table 15. First and third year survival records for regeneration between 1987 to 2011, and acres certified as stocked from 1992 to 2011.**

Year Planted	Acres Planted	1 <sup>st</sup> Year Survival	3 <sup>rd</sup> Year Survival	Acres Certified
1987	481	78%	64%	0
1988	364	95%	78%	0
1989	589	90%	65%	0
1990	555	96%	92%	0
1991	452	92%	70%	0
1992	799	82%	70%	3,154
1993	818	89%	66%	1,021
1994	1,281	71%	57%	1,189
1995	1,231	80%	45%	773
1996	823	33%	33%	673
1997	492	96%	88%	464

<b>Year Planted</b>	<b>Acres Planted</b>	<b>1<sup>st</sup> Year Survival</b>	<b>3<sup>rd</sup> Year Survival</b>	<b>Acres Certified</b>
1998	438	86%	77%	633
1999	390	74%	74%	109
2000	452	95%	84%	571
2001	278	97%		0
2002	141	44%		0
2003	127			1,794
2004	114			802
2005	96			84
2006	104			1,808
2007	138			859
2008	265			178
2009	268	92%	80%	146
2010	256	92%	72%	0
2011	295	96%	55%	280

Most areas that were harvested through a final harvest treatment prior to the adoption of the Forest Plan have regenerated to an adequate restocking level. Recent planting activities have been focused on restoration of Engelmann spruce from the bark beetle epidemic, which has destroyed much of the mature spruce on the Cedar City RD and Powell RD. Survival rates for the recent spruce plantings have generally been above 90 percent. Third-year surveys for past spruce plantings are indicating survival rates at 70 percent. Spruce restoration has been highly successful where seedlings are established; this work is expected to continue for at least the next decade.

The Forest has begun planting ponderosa pine in burned-over areas that are in need of reforestation. These planted areas have occurred on a variety of sites including some that are on harsh sites that were severely burned. The survival rates were excellent in ponderosa pine that was planted in 2010 with survival rates of 92 percent. Third-year survival rates of ponderosa pine was 87 percent. A crucial aspect to ponderosa pine seedling survival was the installation of Vexar tubing to protect seedlings from browsing.

Climate continues to be a challenge to seedling establishment. Drought has continued to affect survival of young trees; however, the use of containerized seedlings has improved seedling survival, especially on basaltic soils. Also, the use of microsites has improved survival rates. These high survival rates are encouraging and all of these planted areas should contain adequate stocking within five years.

Survival rates for planted stock are excellent across the Forest on many types of sites. The use of container stock over the last few years has improved survival success and will continue to be used. There is a need to increase the Forest's tree seed inventory, as collections of cones for Engelmann spruce have dramatically decreased with the high levels of mortality, but will need to be replenished as spruce is desired to be planted over many more acres. There is also a need to collect ponderosa pine seeds to reforest burned-over sites as well as sustain ponderosa pine if there is a mountain pine beetle outbreak.



Overall, reforestation needs continue to be identified during vegetation management planning, especially in areas affected by the spruce beetle epidemic. All harvested areas have been and will continue to be adequately stocked where under-stocked. Planting will likely continue to be the method of reforestation in conifer stands, although natural regeneration will be encouraged where feasible. Natural regeneration will be the method of reforestation for aspen stands.

### **Interpretation.**

**Is further evaluation needed?** No. Though no five-year measurements have been made for treatments harvested since 1987 under the Forest Plan, provides the 1<sup>st</sup> and 3<sup>rd</sup> year survival records for artificial regeneration (planting) that has occurred between 1987-2011.

**What are the implications?** Most areas that were harvested through a final harvest treatment prior to the adoption of the Forest Plan have regenerated to an adequate restocking level. However, some areas have not reached adequate stocking level. In these areas, work and evaluation will continue toward adequate restocking. The standards and guidelines implemented in the Forest Plan will be used to prevent these problems in the future.

**Conclusion.** Adequate restocking information will allow us to assess the effectiveness of the standards and guidelines and make additional adjustments, if necessary.

### **Monitoring Resources Available.**

Certified Silviculturists conduct monitoring to meet the Code of Federal Regulations.

### **Recommendation.**

Continue monitoring.

## **F. Maximum Clearcut Opening Size**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Maximum size of openings created by clearcuttings	Annually report and review timber sale silvicultural prescriptions and post-sale silvicultural exams on a project basis.	H/H	Clearcut sizes either restrict timber harvest practices or adversely affect visuals or other resource values.

### **Methods.**

Evaluation of maximum size of openings created by clear-cutting.

### **Variation.**

Clearcut sizes either restrict timber harvest practices or adversely affect visuals or other resource values.

## Results.

A total of 1,516 acres were clearcut in various sales during 1987-2011 to meet objectives such as insect and disease control and aspen regeneration. There have been no perceived or recorded adverse effects to harvest practices, visual quality, or other resources values because of the size or location of the clearcut.

## Interpretation.

**Is further evaluation needed?** No, the data indicate that clearcut sizes have not restricted timber harvest practices or adversely affected visuals or other resource values.

## What are the implications?

The use of clearcuts does not appear to result in adverse impacts.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified.

## Monitoring Resources Available.

Resources have been allocated for this monitoring.

## Recommendation.

Continue monitoring to assess the impacts of clearcut size and effects on other resources.

## G. Reforestation and TSI Accomplishment

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Reforestation and Timber Stand (TSI) improvement accomplishment.	Annually report and review TSI and reforestation needs and accomplishment reports, KV plans.	H/H	Failure to meet targets or accomplish KV needs in timber sale plans.

## Methods.

Evaluation of reforestation and timber stand (TSI) improvement accomplishment.

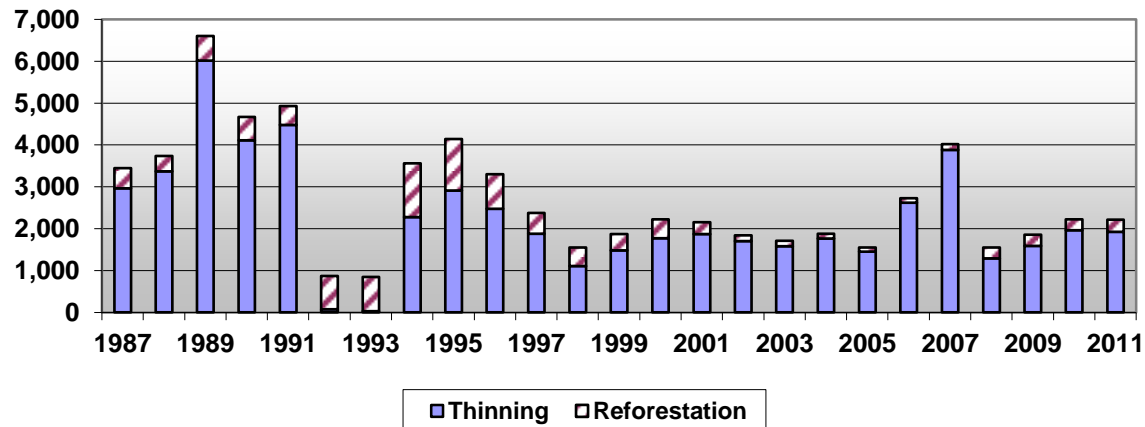
## Variation.

Failure to meet targets or accomplishments using funds under authority of the Knudsen Vandenburg Act (KV) needs in timber sale plans.

## Results.

The Forest Plan projected 5,000 acres per year in thinning and 1,588 acres per year in reforestation. The following acres (Figure 8) have been reforested and thinned from 1987 to 2011.

**Figure 8. Acres thinned and reforested on the Dixie National Forest from 1987 to 2011.**



### Interpretation.

**Is further evaluation needed?** No. Thinning and reforestation needs are assessed and identified during the site-specific timber sale project analysis, and are being accomplished as identified. Thinning/reforestation accomplishments to date have not met the projections of the Forest Plan. This is due to the decline in the timber harvest program and the accomplishment of most thinning needs early in the monitoring period. Reforestation projections are expected to continue in conjunction with the bark beetle recovery projects in the spruce type and within burned ponderosa pine.

**What are the implications?** Thinning and reforestation needs are assessed and identified during the site-specific timber sale project analysis, and are being accomplished as identified. Reforestation projections are expected to continue in conjunction with the bark beetle recovery projects in the spruce type and within burned ponderosa pine.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified.

### Monitoring Resources Available.

Thinning targets are reported annually in the Forest Service Activity Tracking System (FACTS)

### Recommendation.

Continue monitoring.

## H. Fuelwood Consumption and Supply

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fuelwood consumption and supply	Determine supply by fuels inventories and acres available; determine demand by monitoring permits issued and sampling actual removal on a project basis; annual reporting.	H/M	Supply is not meeting or projected to not meet demand within 5 years.

### Methods.

Evaluation of fuelwood consumption and supply.

### Variation.

Supply is not meeting or projected to not meet demand within five years.

### Results.

Vegetative management practices on the Forest result in the availability of an estimated 14,000 cords of fuelwood annually. During the first five years of the Plan period, an average of 4,764 cords of fuelwood was utilized each year. After natural gas was delivered to the major population centers in the area, the fuelwood consumption has declined to approximately 5,000 cords per year. In the past ten years, the Forest has experienced catastrophic Engelmann spruce tree mortality due to a spruce bark beetle epidemic. This has resulted in thousands of acres of dead trees and heavy volumes/acre of fuel loading contributing to an increasing amount of fuelwood availability.

**Table 16. Fuelwood (Cords) Permitted by Ranger District, 2007-2011**

Fiscal Year	Pine Valley	Cedar City	Powell	Escalante	Total
2007	765	2,128	897	516	4,306
2008	812	2,259	1,107	540	4,718
2009	732	2,410	1,172	478	4,792
2010	802	2,351	1,120	609	4,882
2011	871	2,374	1,148	729	5,122

### Interpretation.

**Is further evaluation needed?** No. Although localized fuelwood shortages may occur, primarily in the St. George area, the fuelwood supply appears to be able to meet the projected demand during the next five years.

**What are the implications?** The importance of meeting demands for fuelwood may have changed since the Forest Plan was written.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

## Monitoring Resources Available.

Sales of fuelwood are recorded annually in the Timber Information Manager (TIM) system.

## Recommendation.

Continue monitoring.

## I. Growth Responses

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Growth response of regenerated stands, precommercially thinned stands, and cutover sawtimber (including effects of insects and diseases).	Every 5 <sup>th</sup> year, stage II stand examinations, permanent growth plots; annual reporting.	H/H	± 10% variance in actual growth measured against assumptions made in growth simulations (PROGNOSIS)

## Methods.

Stage II stand examinations and permanent growth plots.

## Variation.

A 10% plus or minus variance in actual growth measured against assumptions made in growth simulations (PROGNOSIS) is the variation that would cause further evaluation and/or change in management direction. The Forest Plan projected potential growth (cubic feet/acre/year) to be 20 to 40 on 89,424 acres, and 50 to 84 on 241,776 acres.

## Results.

Four permanent growth plots were established in 1991, and one in 1990. Post-harvest Stage II stand examinations were completed on stands on the Cedar City, Powell, and Teasdale Districts during 1991.

A random sample of 581 trees measured in the 1980 Forest Inventory shows a diameter growth of 0.7 inches per 10 years in natural stands. Post-harvest growth studies conducted in managed stands during 1991 disclosed an average diameter growth of 1.6 inches per 10 years. Preliminary findings are that increased growth response is evident in sampled managed stands. Permanent growth plots have not been measured since 1991.

## Interpretation.

**Is further evaluation needed?** No. Although data presented were in inches per ten years rather than cubic feet/acre/year, growth responses to managed stands are positive.

**What are the implications?** Thinning was intended to promote wood growth. Since the Plan was written, emphasis is now on ecosystem health rather than growth for production.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

### Monitoring Resources Available.

Monitoring of the recently established growth plots provided data for this Forest Plan requirement.

### Recommendation.

Continue monitoring. Revisit growth plots and re-measure.

## J. Timber Supply Projections

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber supply projections.	Stage II stand examination to complete exam on remainder of commercial Forest land annually in an accelerated basis until completed. Work toward goal of 45,000 acres per year on a continuing basis; annual reporting.	H/H	± 10% variation in projections measured against Forest Plan projections.
	Stage I timber inventory by 1989 or sooner; reporting 5-years or before Forest Plan update.	H/H	

### Methods.

Work was completed on a 10-year Forest timber inventory and vegetation classification. The vegetative classification portion of the timber inventory (using LANDSAT imagery) was initiated in 1991.

The Interior West Resource Inventory, Monitoring, and Evaluation (IWRIME) Program of the U.S. Forest Service, Intermountain Research Station, completed an extensive, comprehensive inventory of all forested lands in Utah in 1995, which included the Dixie National Forest. A two-phase sampling procedure was used. Phase 1 used a grid of sample points on maps and photos and Phase 2 was the field phase that involved measuring of sample points. Stand examinations have been completed on an average of 23,400 acres per year, and the data used in the evaluation of out-year sales.

### Variation.

A 10% plus or minus variation in projections measured against Forest Plan projections would cause further evaluation and/or change in management direction. Projections for timber supply productions are estimated as an annual average for the first decade equaling 24,700 MBF<sup>9</sup>/4,960 MCF<sup>10</sup> (Table II-24 on page II-29).

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<sup>9</sup> MBF = thousand board feet.

<sup>10</sup> MCF = thousand cubic feet.

## **Results.**

The latest Forest inventory (1998 Inventory) shows the following results:

- Net volume of sawtimber (Scribner rule) on nonreserved timberland is 3,534,863 MBF/1,197,122 MCF
- Net annual growth (Scribner rule) of sawtimber trees on nonreserved timberland is 45,134 MBF/15,364 MCF
- Annual mortality of sawtimber (Scribner rule) on nonreserved timberland is 53,763 MBF/18,800 MCF

## **Interpretation.**

**Is further evaluation needed?** Not determined.

**What are the implications?** Stand examinations have not proven effective in determining Forest-wide timber supply projections. Timber supply projections should be determined by the Forest-wide timber inventory.

**Conclusion.** Timber supply projections should be determined by the Forest-wide timber inventory.

## **Monitoring Resources Available.**

The latest Forest inventory in 1998 is the source used.

## **Recommendation.**

The monitoring requirement for Stage II stand exams should be modified or dropped and stand exams limited to use in timber sale project planning (Forest Plan amendment). Use the 10-year Forest-wide inventory and vegetation classification to determine timber supply.

## SECTION 11. SOILS

### A. Long-Term Soil Productivity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Long-term soil productivity	Fabric dams, erosion pins, visual estimates, photo points, and/or other accepted methods on 2 locations per year; annual reporting.	H/M	Exceeding established soil loss tolerance levels.

#### Methods.

Recommendations are made on a project-by-project basis to ensure long-term soil productivity is maintained.

#### Variation.

The variation which would cause further evaluation and/or change in management direction is exceeding established soil loss tolerance levels.

#### Results.

Two sites were monitored in 2011:

- 1) Stumps Springs Prescribed Fire – Prescribed fire was utilized as a vegetative management tool in 2009 to accomplish sagebrush/meadow restoration on the Escalante Ranger District. This site has shown slow vegetative recovery and wind-erosion hummocks.
- 2) Buzzard Timber Sale Monitoring – Erosion control with the utilization of slash on skid trails has shown to be effective in deterring sediment movement on these high-use areas.

#### Interpretation.

**Is further evaluation needed?** Yes, wind erosion and grazing pressure on the Stump Spring prescribed fire site could be contributing to the slow vegetative recovery for this area. Also, seeding is recommended in soils similar to this site.

**What are the implications?** Consider grazing effects and supplemental seeding to assist in the successful implementation of prescribed fire treatment in sagebrush meadows.

**Conclusion.** We need to continue to monitor various projects associated with prescribed burning, forage utilization, and timber sales.

#### Monitoring Resources Available.

Project monitoring by District and Forest personnel has been available for soil resources.

#### Recommendation.

Continue monitoring.



**Figure 9. Photo sequence taken in December 2009, September 2010, and July 2011 of the Stump Springs Prescribed Fire project.**



## B. Soil Compaction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compaction	Measurement of bulk density and/or pore space on 2 timber sales per year; report annually.	H/H	15% increase in bulk density or 50% decrease in pore space

### Methods.

Bulk density core sample analysis on the Buzzard and Road Draw salvage sales were monitored in 2011.

### Variation.

A 15% increase in bulk density or 50% decrease in pore space is the variation that would cause further evaluation and/or change in management direction.

### Results.

Compaction monitoring was completed on two timber sales in 2011.

Buzzard Timber Sale Monitoring – 67% of the skid trails (8,390 feet) in the analysis area were compacted by more than a 15% bulk density increase. The largest increase in bulk density was 31% increase that was associated with multi-pass skid trails. The range in the increase of soil bulk density is 12% to 31%. 1.7 acres of log landings within the analysis area have visual indications of excessive compaction (more than 15% increase in soil bulk density). This occurs from very frequent activity from skidders and log loading and hauling equipment. In total, 15.5% of the analysis area measured is affected by more than a 15% increase in bulk density (soil compaction).

Road Draw Timber Sale Monitoring – All of the skid trails (4,294 feet) of the soils in the analysis area were not compacted by more than a 15% bulk density increase. The largest increase in bulk density was 12% that was associated with multi-pass skid trails. 0.45 acres of log landings within the analysis area have visual indications of excessive compaction (more than 15% increase in soil bulk density). This occurs from very frequent activity from skidders and log loading and hauling equipment. In total, 2.1% of the Road Draw analysis area measured is affected by a 15% increase in bulk density (soil compaction).

### Interpretation.

**Is further evaluation needed?** No, findings have shown that an increase in bulk density has occurred, but these sites may not be detrimentally disturbed by following Forest Service Manual direction (FSM 2550).

**What are the implications?** None.

**Conclusion.** We are meeting our intention of not detrimentally affecting long-term soil productivity in more than 15% of project areas.



### **Monitoring Resources Available.**

Timber sale administrators and soil scientists conduct soil compaction monitoring on a project basis.

### **Recommendation.**

Implementation and effectiveness monitoring will continue to be done on selected timber sales to ensure compaction damage does not exceed Soil Quality Manual direction.

**Figure 10. Soil compaction monitoring on skid trails associated with the Buzzard timber sale was completed in 2011.**



## C. Uplands Adjacent to Riparian

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Upland areas adjacent to riparian management areas.	Fabric dams, erosion pins, visual estimates, photo points, and/or other accepted methods on 2 locations per year; report first and fifth year following management practice.	H/M	Exceed Forest Standards and Guidelines.

### Methods.

The Pretty Tree Bench Prescribed Fire Project (Escalante Ranger District) and the East Fork Dispersed Camping Project (Powell Ranger District) were monitored in 2011.

### Variation.

Exceed Forest standards and guidelines.

### Results.

Pretty Tree Bench Prescribed Fire Project - This project did not have any measureable adverse impacts on the uplands next to the riparian Management Area (9A), likely due to the low fire intensity. Although fire was allowed within less than 100 feet from the stream channel, the low hillslope gradient, low fire intensity, and absence of fire from the thick riparian vegetation kept adverse impacts to the stream at a minimum.

East Fork Dispersed Camping Project - This project has been successful at limiting damage to riparian areas due to dispersed camping. However, it is recommended that for areas where erosion has occurred in the past, active projects such as erosion matting and/or seeding can be done to recover such areas; this is recommended because it was observed that merely preventing further ATV or other types of traffic on such areas has not led to recovery for some of these locations.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** Consider using erosion matting and seeding to highly impacted and/or erosive soil conditions.

**Conclusion.** We need to continue to monitor various projects associated with riparian Management Areas (9A & 9B).

### Monitoring Resources Available.

Projects near riparian Management Areas are monitored annually by zone hydrologists.

### Recommendation.

Continue monitoring.



**Figure 11. Looking downstream parallel to stream at edge of burn and Sweetwater Creek riparian area.**



## D. Soil and Water Resource Protection

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and water resource protection – project EA mitigating requirements	Visual estimates on 1 project per year per Ranger District; annual reporting.	H/M	Mitigating requirements not implemented or not working

### Methods.

Four projects emphasizing monitoring specifically of EA mitigating requirements (also known as “best management practices” or BMPs) were completed in 2011.

### Variation.

Mitigating requirements not implemented or not working would cause further evaluation and/or change in management direction.

### Results.

Main Canyon Irrigation Project (Pine Valley Ranger District) – The implementation of properly spaced road drainage, seeding, road decommissioning, and erosional control matting has stabilized sediment movement from the implementation on of the pipeline construction associated with the New Harmony Irrigation Company improvements.

Buzzard Timber Salvage Sale (Cedar City Ranger District) – The implementation of a properly spaced skid trail network and adherence to Soil and Water Conservation Practices (SWCPs) relating to soil moisture operational levels and the design and management of log landings was effective in minimizing detrimental soil disturbance within this sale.

Sunset North Fuel Treatment (Powell Ranger District) – While there were no erosional features observed from the burn piles near the stream, there were also no indications of heavy precipitation events causing erosion elsewhere in the project area (e.g., exposed bare soils from vegetation removal and any burn piles, including those away from streams, showed signs of erosion). However, due to the close proximity of some burn piles to the streams, if a heavy precipitation event does occur, it is likely that sediment transport from the burn piles to the stream will occur. Besides connectivity to the stream, burn piles were to be excluded from within 100 feet of the streams so as to prevent burning riparian vegetation and sterilization of riparian soil from high heat in those locations. After conducting this monitoring it is recommended that the fuels treatment crews are briefed before implementation by the resource areas who wrote the mitigation features as to what the mitigation features for a project are and the reasons for having such mitigation features.

Toad Timber Salvage Sale (Escalante Ranger District) - The diminished effectiveness of the waterbars was a direct result of the equipment being used for constructing them. A skidder with a non-articulating blade was used to construct the waterbars and consequently angling waterbars and avoiding driving over the top of them during construction is difficult. The amount of large woody material placed on the skid trails was not adequate to be effective at preventing erosion. Part of the reason for a lack of large woody material could be due to the



fact that within a burned salvage sale there may not be adequate amounts of large woody material readily available. I would recommend that within the design of timber harvest projects for similar burned stands that it be required that a number of trees be cut and used for down woody material on skid trails.

### **Interpretation.**

**Is further evaluation needed?** Yes, best management practices need further monitoring and emphasis in environmental documents to ensure that they can be implemented properly on the Forest.

**What are the implications?** Best management practices are failing on the Forest, more communication is needed on the importance of properly implementing the practices described in projects.

**Conclusion.** The Forest soil scientist and Zone hydrologists need to continue to educate resource staff on the use of BMPs.

### **Monitoring Resources Available.**

Projects are monitored annually by Zone hydrologists and Forest soil scientist.

### **Recommendation.**

Continue monitoring. Project administrators should document BMP implementation on site through use of simple BMP checklist compiled from NEPA document.

**Figure 12. Compromised waterbars on a skid trail associated with the Toad Salvage Sale.**



## E. Soil Survey Activities

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil survey activities.	Progress reviews, management attainment report annually during years of programmed survey work; report annually.	H/H	± 15% of Plan direction

### Methods.

Evaluation of soil survey activities on the Dixie National Forest.

### Variation.

Forest Plan direction is to complete the soil resource inventory at an Order 3 level on the productive forest and rangeland, and an Order 4 level on lower producing lands (page II-52).

### Results.

Forest-wide field soil inventory data collection (described on page II-51 of the Forest Plan) has been completed. Future analysis of this data will determine if additional fieldwork is needed.

### Interpretation.

**Is further evaluation needed?** No. Inventory completion is within the 15% variance.

**What are the implications?** None.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

### Monitoring Resources Available.

Resources have been available for this inventory.

### Recommendation.

Soil survey work will now shift to population and utilization of the National Soil Information System (NASIS) database to assist with project- and above-project-level analysis.



## F. Soil and Water Improvements Inventory

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and water resource improvement needs inventory	Annual Update and report.	H/H	Detection of improvement needs requiring early treatment or of higher priority than on current list.

### Methods.

Assessments of ecosystems above the project-level to identify and prioritize restoration and land management actions necessary to achieve management objectives for watersheds and landscapes.

### Variation.

Detection of improvement needs requiring early treatment or has higher priority than on current list.

### Results.

The Watershed Condition Framework was completed in 2011 and rated all watersheds as properly functioning, functioning-at-risk, or impaired. This database will be used to select watershed projects in the future for the Forest. Two watershed action plans (Birch Creek and Tropic Reservoir) were developed from this process that identifies specific watershed improvement projects that will be pursued within the next few years.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** Watershed improvement needs are being identified where desired conditions are not being achieved.

### Monitoring Resources Available.

The hydrologists have increased support to Districts and will update the Forest-wide watershed condition framework (WCATT) as needed, to develop proposals for out-year project planning to define improvement objectives and, with the Soil and Water Program Manager and Ecosystem Management Staff Officer, program adequate out-year funding to accomplish objectives. Districts and the hydrologists will coordinate more closely on implementation of complex projects, by clearly defining objectives and developing plans well in advance of implementation.

### Recommendation.

Continue updating watershed needs inventories.

**Figure 13. Road decommissioning projects, such as this one near Dead Lake, are treatments that reduce sediment and wet meadow soil compaction.**



## SECTION 12. WATER

### A. Water Quality Standards Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with State Water Quality Standards	Monthly baseline monitoring as described in Dixie Water Quality monitoring Plan, coordination with State 208 Agency; report annually.	M/M	Violation of Utah Water Quality Standards.

#### Methods.

Monthly baseline water quality monitoring sampling.

#### Variation.

Violation of Utah Water Quality Standards.

#### Results.

Water quality on four sites were sampled and analyzed in fiscal year 2011.

1. Headwaters Santa Clara River (STORET 4940660), tributary to the Virgin River
2. Pinto Creek (STORET 4950640), flows into Newcastle Reservoir
3. Birch Creek (STORET 4953942), tributary to the Escalante River
4. North Creek (STORET 4954625), tributary to the Escalante River

Santa Clara River: Twelve field samples were taken; exceedence occurred with phosphorous on two samples (compared to four the previous year). The months that exceeded standards were November and December of 2010. Winter 2010 produced a combination of high temperatures and high precipitation which lead to episodes of runoff and flooding in excess of 25-year events. Some of the phosphorous normally flushed out during spring run-off may have come early this year as a result of these events. Also, in spring of 2009 a project was initiated in Pine Valley to remove recreation and camping areas adjacent to the stream and build larger campgrounds at upland locations which allow for a more effective vegetative stream buffer. While construction has continued through 2011, much of the restoration activity near the stream was completed early in implementation, during 2009 and 2010. This may be one factor contributing to higher phosphorous during the preceding year. There was also a fire in the Pine Valley Wilderness during late summer 2009 which may have provided higher levels of organic phosphorous during the spring of 2010 than those normally available.

Most phosphorous values were lower in 2011 than the previous year. Flow was higher in 2011 than 2010, and turbidity was lower, suggesting that sedimentation of fine clays (which are likely to adsorb phosphorous) may have also occurred at lower rate during in 2011.

Pinto Creek: Twelve samples were taken; exceedence occurred with phosphorous on eight samples, one more than the previous year, though more samples were taken in 2011. All exceedences were with the acute water quality standard. The months that were exceeded were

October and November 2010, January 2011, and March through July 2011. The other months were just below the acute level allowed. The month with the highest level of phosphorous, April 2011, was during the high flow associated with the snowmelt during the spring runoff period.

Flow rates in Pinto Creek were slightly higher in 2011 than the previous year through most months. Phosphorous was lower early in the 2011 and did not reach the peak levels represented in the year before. However, it was slightly higher in 2011 throughout the spring runoff, after the initial pulse. Like the Santa Clara, Pinto Creek was also affected by flooding in the winter of 2010, which may account for a lower initial pulse of phosphorous early in the year. One factor contributing to phosphorous levels may be the general instability of Pinto Creek banks and the added fines resulting from widening and entrenchment of the stream channel over the last several years. Pinto Creek was also added to the 2010 draft Utah 303(d) list of impaired waters for macro-invertebrates.

Birch Creek: Although 12 field samples were taken, only 11 samples were analyzed by the lab. All pH and Dissolved Oxygen measurements were within the range of standards. Exceedence occurred with phosphorous on four samples. The months that were exceeded were February, March, May, and June 2011. The other months that had detectable levels were just below the acute level allowed. The months with the highest level of phosphorous were during the high flow associated with the snowmelt during the spring runoff period. Phosphorus levels are likely to be related to the surrounding geology and flow-paths associated with snowmelt through a particular lithology.

North Creek: Like with Birch Creek, although 12 field samples were taken, only 11 samples were analyzed by the lab. There were no exceedences for pH or Dissolved Oxygen on the months measured. Exceedence occurred with phosphorous on eight of the samples. The only months that did not exceed standards for phosphorus were December 2010, March 2011, and July 2011. However, all but three of the exceeding months had total phosphorus amounts that were the same value as the standard (0.05). One of the months with the highest level of phosphorous was during the high flow associated with the snowmelt during the spring runoff period. The other month with the highest total phosphorus level was during the late summer/early fall when the base flow is typically low. Although only higher by 0.05 mg/l than the lowest level measured, the higher phosphorus level during the spring is likely to be related to the surrounding geology and flow-paths associated with snowmelt through a particular lithology. The higher phosphorus level in September could be associated with rainstorm-induced flows and associated flow-paths preceding the sampling date, even though flow levels had dropped back down to base flow levels by the time sampling had occurred.

## **Interpretation.**

**Is further evaluation needed?** Yes. Some samples exceeded the State phosphorus criteria levels. The remaining parameters had a one hundred percent compliance with State Water Quality Standards.

**What are the implications?** Some streams may not have the capability to meet water quality standards due to the nature of the soil and geology, especially phosphorus. Water quality

sampling indicates that we are usually in compliance with State of Utah Water Quality Standards. Exceptions to this appear to be phosphorus and suspended sediment.

Results from different sampling sites from different years on the Forest are starting to show a trend of perpetually exceeding standards for phosphorus, leading to a hypothesis that native geology is playing a measurable role in phosphorus input to many of the streams in southwestern Utah.

**Conclusion.** Natural background of geologic materials may be affecting water quality more than land management practices.

### **Monitoring Resources Available.**

District and Forest Hydrologists plan and implement monitoring water quality. Sampling has been done every year on a monthly basis.

### **Recommendation.**

In order to measure water quality that is reflective of watershed conditions, it is important to select sites for sampling that will be as stable as possible so as to avoid measuring localized anomalies in the stream water quality.

## **B. Best Management Practices – Water Quality**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness of Best Management Practices in meeting water quality objectives and goals.	Project monitoring as described in Dixie Water Quality Monitoring Plan or project plans, to include chemical, physical, bacteriological, invertebrate, sedimentation or other parameters needed to meet monitoring objectives, variable frequency for measurement and reporting.	H/H	Non-achievement of water quality goals, violation of Utah Water Quality Standards
	Inspection of drainage and erosion control measures on ground disturbing activities annually; annual reporting.	M/M	Exceed Forest standards and guidelines.

### **Methods.**

Project monitoring to evaluate if sedimentation or other parameters needed to meet monitoring objectives.

### **Variation.**

Not achieving water quality goals, violation of Utah Water Quality Standards, and exceeding Forest standards and guidelines would cause further evaluation and/or a change in management direction.

**Results.**

The Bear Creek culvert removal was monitored in 2011 after the Motorized Travel Plan implementation was conducted on the Escalante Ranger District. Although vegetation is starting to grow on the steep bank where the culvert was removed, the bank is nearly vertical and as such it is likely to slough during higher flow events as the bank experiences sheer stress. It is recommended for future similar culvert removals that the removal include sloping the banks back to a near 45 degree angle so that bank sloughing would be minimized and more vegetation establishment could occur.

**Interpretation.**

**Is further evaluation needed?** Yes, implementation of the culvert removal was not successful at reducing sediment input to the stream.

**What are the implications?** Yes, revise local soil and water conservation practice implementation objective to place the adjacent soil slopes to 45 degree angle.

**Conclusion.** Soil and water conservation practices should be evaluated and adjusted for local conditions, as more motorized travel implementation occurs on the Forest.

**Monitoring Resources Available.**

Zone Hydrologists conduct monitoring on a project basis.

**Recommendation.**

Continue monitoring.



**Figure 14. Looking upstream at the culvert removal site on Bear Creek (Escalante Ranger District) in August 2011.**



### C. East Fork Sevier River Water Yield Increases

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Water yield increases in East Fork of Sevier Watershed	WRENSS water yield methodology; annual monitoring and reporting.	L/M	Exceed minimum management requirements in timber harvest model

#### Methods.

Water yield measurements.

#### Variation.

Exceeding minimum management requirements in timber harvest model.

#### Results.

This monitoring has been dropped from consideration. It is not our intent to increase the spring discharge of the Sevier River but rather to improve and maintain the channel, floodplain, and sponge/filter system of the watershed in such a way as to maintain a dynamic equilibrium within the watershed.

#### Interpretation.

**Is further evaluation needed?** No, not relevant.

**What are the implications?** The premise for this monitoring is no longer accepted science.

**Conclusion.** There is a variation causing further evaluation and/or change in management direction, which is the premise that management activities would be designed to increase water yield, when the desired conditions are not such.

#### Monitoring Resources Available.

No resources have been allocated for this monitoring.

#### Recommendation.

A Forest Plan amendment is needed to drop this monitoring requirement.

### D. East Fork Sevier River Stream bank Stability

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Stability of Stream banks in East Fork of Sevier River drainages	Sequential photopoints, measure stability rating in representative reaches; annual reporting and monitoring.	M/M	Exceed Forest standards and guidelines



## **Methods.**

General Technical Report RMRS-GTR-47 “Monitoring the Vegetation Resources in Riparian Areas” by Alma H. Winward, April 2000.

Additional clarification for riparian studies was adapted from General Technical Report RMRS-GTR-121 “Guide to Effective Monitoring of Aquatic and Riparian Resources – Part III: Effectiveness Monitoring for Streams and Riparian Areas Within the Upper Columbia River Basin: Sampling Protocol for Integrator Reaches Vegetation Parameters” by Marc Coles-Ritchie and Richard C. Henderson, March 2004.

Additional clarification for riparian studies and species’ ecological status and stream bank stability ratings were adapted from Idaho Technical Bulletin No. 2005-02 “Monitoring Stream banks and Riparian Vegetation – Multiple Indicators” by Ervin R. Cowley and Timothy A. Burton, September 2005.

## **Variation.**

Variation that would cause further evaluation and/or change in management direction would be to “Exceed Forest standards and guidelines”.

## **Results.**

During 2011, 185 long-term trend monitoring studies were completed on the Dixie National Forest. 124 were upland range trend monitoring studies, 49 of these monitoring studies were Level III Riparian Inventories, and 12 were photo points completed by Forest personnel.

These monitoring studies were performed in 58 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. People on this crew included Mark Madsen (Forest Botanist), and John Perez (Biological Science Technician). These monitoring studies were accomplished during the 2011 field season from April 1 – November 1.

*Stream bank stability:* Forest Plan standards and guidelines for bank stability (general direction – standard and guideline 4A – pg. IV-42) and wildlife and fish (general direction - standard and guideline 6B – pg. IV-33) require that we “maintain 50 percent or more of total stream bank length in stable condition.” For this analysis, this standard is interpreted as maintaining 50 percent of all riparian areas with at least a moderate bank stability rating. Out of the 49 Level III Riparian Inventories sampled on the Dixie National Forest in 2011, 45 (92%) had stream bank stability ratings that were rated as moderate, good, or excellent. These ratings indicate long-term stable bank conditions in these riparian areas. There were five sample sites evaluated for the East Fork of the Sevier River drainage in 2011. Of these five sample sites evaluated, four (80%) of them had stream bank stability ratings that were rated as moderate, good, or excellent. One site had a stream bank stability rating of poor.

**Interpretation.**

**Is further evaluation needed?** The 2011 sample of riparian areas on the Dixie National Forest are meeting this Forest Plan standard and guideline. Therefore, no further evaluation and/or change in management direction is needed at this time.

**What are the implications?** If the stream bank stability levels drop below 50 percent, increased habitat loss and sedimentation could occur.

**Conclusion.** In 2011, there were three study sites, or 17% of the sample, that had ground covers of less than 80% along the green-line. These three study sites not meeting Forest Plan standards and guidelines for ground cover in special management area riparian systems occur on Cedar City Ranger District. Percent ground cover on these three sites not meeting the standard may need to be evaluated to determine if a change in management is needed and able to improve them.

**Monitoring Resources Available.**

Yes. This monitoring is the responsibility of the Dixie NF Botanist and long-term vegetation monitoring crew.

**Recommendation.**

Continue to monitor the East Fork Sevier stream bank stability annually. Areas not meeting Forest Plan standards and guidelines for riparian condition should be sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

## E. Watershed Improvement Effectiveness and Maintenance Needs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness and Maintenance needs of watershed improvements	Visual inspection 1 <sup>st</sup> year after installation and every 5 years thereafter. Annual reporting.	L/H	Maintenance required or project not accomplishing stated objectives.
	Volumetric measurements of retained sediments, variable frequency and reporting.	M/M	Project not accomplishing stated objectives

### Methods.

Visual project monitoring.

### Variation.

For watershed improvements, stated objectives are not met or maintenance not completed.  
For retained sediment, project not accomplishing stated objectives.

### Results.

During 2011, visual project monitoring of road closures were conducted with the following observations:

- The most successful road decommissioning occurs with full re-contouring and proper coarse woody debris placement on the restored surface.
- Seeding is successful at any time of the year and more than 30 lbs/acre is recommended.
- Use of erosion control matting on south facing slopes, slopes over 30%, highly erosive areas, and sensitive riparian areas is highly effective at maintaining sediment control and reestablishing new vegetative growth (grasses & forbs).
- Approximately 15-20% of the site distance closures are being compromised by unauthorized use due to a lack of physical closure barriers.
- Compacted road surface that are not ripped (such as past site distance rock barrier closures) will remain unvegetated for five years or more, especially in the Claron formation.

The South Hollow watershed improvement project involved maintaining a check dam (also serves as a watering hole for wildlife), reshaping and seeding a gully, and building an exclosure. The exclosure was built with wood post and pole fencing in 2001. Although the gullies still have bare soil and are susceptible to erosion, vegetation in the gullies appears to have increased. Additionally, grass has grown in what used to be some of the bare meadow locations. The check dam appears to be in good condition and doesn't appear to have filled noticeably with sediment. The wooden post and pole fence is in good condition and has only one location where maintenance is needed (needs a pole replaced). Sediment deposition

along the edge of some portions of the fence has covered or left the bottom pole in contact with the soil. The fence has been effective at excluding cattle from the restoration area.

**Interpretation.**

**Is further evaluation needed?** Yes, many projects were not monitored after they were installed.

**What are the implications?** We are not learning from projects we are implementing to improve resource protection.

**Conclusion.** We need to emphasize follow-up monitoring on watershed project implementation.

**Monitoring Resources Available.**

District and Forest Hydrologists conduct monitoring on a project basis.

**Recommendation.**

Continue monitoring. Eliminate volumetric methods.

**Figure 15. South Hollow watershed improvement photos taken in 2001(top) and 2011(bottom).**



## F. Riparian Area Management Goal Accomplishment

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Accomplishment of riparian area management goals	Sequential photopoints, forage utilization level measurements (total and browse), stream channel stability ratings, stream channel morphology measurements, streambed materials measurements; annual monitoring and reporting.	M/H	Exceed Forest standards and guidelines.

### Methods.

Stream channel morphology and materials measurements and water temperature monitoring.

### Variation.

Forest Plan standards and guidelines exceeded.

### Results.

Escalante Ranger District Water Temperature Monitoring - Although limited or no flow data exists for most of the streams monitored, personal ocular observations of the streams that have the least amount of variability in temperature suggest that they are also perennial streams that have a relatively high baseflow (when compared to storm-generated or runoff flows). The large range in temperatures observed in Griffin Springs stream (at ~10,000 ft elevation) is likely due to the lack of shade, the small amount of streamflow and low water velocities, and the high amount of dark stream sediment and basalt rock in and next to the stream channel. Contrastingly, Lake Creek, which also has dark stream substrate but high base flows (~10 cfs) relative to many other streams on the District, and shade provided by both vegetation and topography, has very little daily and seasonal variation. However, this is quite anomalous in that other streams with high baseflows and stream shading don't exhibit the same amount of constancy in temperature as does Lake Creek. The very constant low temperatures in Lake Creek may have less to do with shading, substrate, and channel dimensions, and more to do with the possibility of source water being a deeper groundwater source. Groundwater sources may also help explain the relatively steady decline in the 7-day running daily average stream temperature in Middle Antimony Creek. The relative contributions of surface or shallow subsurface flow could be decreasing more throughout the summer when compared to the deeper groundwater sources and springs; in essence this would lead to a higher proportion of streamflow being derived from deeper groundwater sources. Based on the temperature data variations and anomalies, it would be useful to have deployable stage loggers for many of the streams in better understanding the base hydrologic conditions of the streams. This in turn would be useful in determining the sensitivity of some stream's water temperature to management actions. For example, if the explanation of water temperature in Middle Antimony Creek and Lake Creek as set forth in the previous paragraph holds true, management actions that influence stream shading may not have a measureable impact on water temperature for these streams. Alternatively, streams like Griffin Springs stream may

be very sensitive to changes in stream shading, and management actions to maintain or increase stream shading could be very important for improving water temperatures for aquatic biota.

Willow Creek (Escalante Ranger District) Cross-Sectional Analysis - The channel cross-section shows how shallow the stream channel currently is. Although cross-section data from 2002 cannot be located, the photos taken in 2002 and compared with 2011 suggest that the channel was deeper than it currently is. Recent sediment deposition that has raised the channel bed to near the elevation of the floodplain riparian vegetation can be observed in the 2011 photos. The pebble count data suggests that the deposited substrate is primarily small gravel with a lesser portion of fines. Although it cannot be determined at this time what impact the exclosure had on the stream channel morphology, one possible explanation is that the assumed increase in vegetation height and density due to excluding grazing allowed greater capture of sediment being transported through the system. Another possible explanation could simply be that upstream material from the exposed headcut banks has recently been transported downstream as a result of increased flows during the past couple of wetter years and has overwhelmed the transport capacity leaving depositions of sediment. Now that the exclosure has been relocated downstream, there has been observed a noticeable amount of riparian vegetation grazing from cattle. The current exclosure has had recent repairs and appears to be excluding cattle although evidence of very few cattle in the exclosure was observed. It is recommended that future channel monitoring occurs and that riparian vegetation be monitored to determine if there is an improvement in riparian vegetation in the area that is now excluded from grazing and to determine what trend is for the riparian vegetation in the old exclosure location. It is also recommended that the exclosure be walked each year to make any repairs that may be needed.

Cottonwood Creek (Cedar City Ranger District) Cross-Sectional Analysis - There has been some activation of gravels and fines within the channel; however, cobbles and larger substrate materials were relatively stable. Part of the shift from silt and clay to sand may be accounted for by the different dates the pebble counts were taken. In 2011, sampling was done in the beginning of June of a high water year, when spring runoff was still affecting flows and stream energy held much of the silt and clay in suspension. The 2004 sampling occurred in July, when flow and stream energy was lower, allowing more silt and clay to fall out of suspension and be deposited in the channel. Though the channel structure appears to have been relatively stable, the amount of sand silt and clay within the channel, and the apparent movement of those fines, suggests a steady source of sedimentation to the stream. There is evidence of past fire in the watershed and there has been a shift from native grasses and desert pavement to large areas of cheatgrass invasion. The watershed is part of the Red Creek Allotment, and has some impact from grazing. There is some recreational use in the area, though it is not extensive in this location. The extent to which various uses are affecting the watershed is uncertain but the cumulative effect is causing sedimentation to the stream.

### **Interpretation.**

**Is further evaluation needed?** Yes, allotment monitoring indicates that many of the wetlands and riparian areas associated with streams are at some level of risk.



**What are the implications?** Riparian areas may not be in or moving toward desired conditions.

**Conclusion.** More data are needed to determine if there is a variation causing further evaluation.

**Monitoring Resources Available.**

Zone and Forest Hydrologists have been conducting measurements.

**Recommendation.**

Continue monitoring to acquire data from which to compare in the future.

**Figure 16. Monitoring stream cross section on Willow Creek (Escalante Ranger District).**





## SECTION 13. MINERALS

### A. Exploration Proposals

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Exploration proposal: adequacy of permitting process	Evaluation of one case history on each Ranger District; annual reporting.	M/M	Non-compliance with the Regional standards and direction

#### Methods.

Evaluation of mineral proposals.

#### Variation.

Non-compliance with the Regional standards and direction.

#### Results.

In 2011, the Dixie NF has processed one individual Plans of Operations for exploration of locatable minerals. Demand continues to be moderate and steady for mineral material disposals from common use mineral sites. Interest and demand continues from State, County, private, and commercial organizations to provide mineral materials (gravel, landscape rock etc.). Coordination efforts continue to work with and meet State and County needs.

#### Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. None.

#### Monitoring Resources Available.

Not applicable.

#### Recommendation.

Continue monitoring when new proposals are received.

## B. Lease/Permit Applications

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Lease/Permit application forms and NEPA process (compliance with Regional standards and direction)	Inventory pending cases, evaluate adequacy of lease/permit and operating plan requirements, review EAs covering leasing and permits. Evaluate one on each Ranger District. Annual reporting.	M/M	Deviation from 1984 (1991) FS/BLM Agreement, lease and operating plan requirement are found inadequate to meet multiple resource needs, EAs inadequate.

### Methods.

Evaluation of leasing/permit process.

### Variation.

Deviation from 1984 Forest Service/Bureau of Land Management (FS/BLM) Agreement, lease and operating plan requirement are found inadequate to meet multiple resource needs, Environmental Assessments (EAs) inadequate.

### Results.

There are roughly 1,300 expressions of interest for oil and gas leasing on the Dixie National Forest. This is similar to the number of expressions of interest present in 2005. The Environmental Impact Statement for Oil and Gas Leasing Analysis was completed for the Dixie NF. A Decision was signed August 23, 2011, making 1,478,227 acres of the Dixie NF available for lease with stipulations. Approximately, 231,513 acres are available with Controlled Surface Use; the remaining acres are available for lease with No Surface Occupancy. The BLM is responsible to respond to these expressions of interest.

The Forest Plan was amended to include Procedures for Oil and Gas Leasing, the Oil and Gas Leasing Matrix, and updated resource protection stipulations for lands administered by the Dixie NF. No changes were made to management directions.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** None.

### Monitoring Resources Available.

Not applicable this reporting period.

### Recommendation.

Monitor leasing and on-lease activity when they resume in the future.

## C. Development Proposals and Administration

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Site-specific development proposals and administration of operations, compliance with terms of operating plans and existing agreements.	Field examination ongoing during operations, outlines in Regional standards. Annual reporting.	H/H	Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan; inadequacy or unreasonableness of lease/permit terms and operating plan requirements.

### Methods.

Field examinations are development proposals.

### Variation.

Any unacceptable or unexpected results that deviate from the environmental assessment and approved operating plan; inadequacy or unreasonableness of lease/permit terms and operating plan requirements.

### Results.

The Dixie National Forest received one new proposals and plan for locatable mineral materials on the Powell Ranger District. Appropriate NEPA was completed. The only active ongoing exploration site on the Pine Valley District has been field-checked on a quarterly basis.

Approximately 20 to 50 saleable material permits are processed annually from designated areas. Compliance reports are completed for 26 oil and gas operations annually. This has been fairly consistent over the past decade.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None presented.

**Conclusion.** There have been no unexpected or unacceptable results that deviate from the Environmental Assessments or Operating Plans for mineral projects during 2011.

### Monitoring Resources Available.

Resources have not been adequate as evidenced by the plans for the most heavily used gravel/borrow pits on the Forest.

### Recommendation.

Continue monitoring.

## D. Reclamation Results

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Reclamation results: Effectiveness of work done	Field examination annually of 25% of operational areas that have been closed 2-3 years; annual reporting.	H/H	Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan

### Methods.

Reclamation and close-out was completed at two locations.

### Variation.

Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan.

### Results.

Reclamation efforts have been monitored on two sites, neither resulting in the release of the reclamation bonds. One reclamation bond was evaluated and reassigned on Pine Valley RD.

Also, the second stage of cleanup for the General Steam site on the Pine Valley Ranger District was completed. Trash and lumber were removed from the site and recontouring was performed. Non-system roads were decommissioned.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

### Monitoring Resources Available.

The Forest Minerals Management Specialist conducts necessary close out and reclamation monitoring. Resources have been available.

### Recommendation.

Continue to contact operators when operations are nearing completion to discuss reclamation required by operating plans. Release bond when work is satisfactory or use bond to complete required work, if necessary.

## E. Reserved and Outstanding Mineral Rights

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Exercise of reserved and outstanding rights by owner of minerals	Monitor mineral-related activity on NFS surface, ongoing frequency. Reporting as activity affecting NFS management occurs.	M/M	Any impacts adverse to NFS management of surface resources.

### Methods.

Evaluation of mineral rights.

### Variation.

Any impacts adverse to National Forest System (NFS) management of surface resources

### Results.

No opportunity to process or administer reserved or outstanding rights occurred over the monitoring period.

### Interpretation.

Is further evaluation needed? N/A

What are the implications? N/A

Conclusion. N/A

### Monitoring Resources Available.

Each Ranger District has a resource specialist with minerals management duties to conduct monitoring. The Forest Minerals Administrator can assist with or take the lead in monitoring as necessary. Minerals program funding has been adequate to allow for the appropriate levels of monitoring – and that level of funding is expected for the foreseeable future.

### Recommendation.

Oil and gas (O&G) leasing activity is expected to resume and may achieve previously high levels encountered in the 1970s and 1980s since the Forest-wide O&G leasing analysis (Environmental Impact Statement) was completed. Monitoring of lease activity, including exploratory drilling, would become a high priority and could require significant increases in funding and personnel time to accomplish.

The number of mineral material sale and free-use permits issued each year remains relatively high. Almost all permits are for material in existing gravel and cinder pits. Some but not all pits have operating plans, but the plans are 20 or more years old and need review and revision. Emphasis is needed on this aspect of mineral activity monitoring in the future.

## SECTION 14. LANDS

### A. Special Use Permits

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Special Use Permits, applications, amendments, and transfers	Quarterly land use reports. Reporting as scheduled in fiscal year action plan.	M/M	Deviation from R-4 standards

#### Methods.

Special Uses Permits<sup>11</sup> applications, amendments, and transfers evaluated in 2011.

#### Variation.

Deviation from R-4 standards.

#### Results.

Twenty-two special use applications, amendments, or transfers in 2011 were evaluated on the Dixie National Forest.

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** This item tracks the volume of work relating to special use permits, applications, amendments and transfers.

#### Monitoring Resources Available.

No resources were allocated to maintain records of applications, amendments, or transfers that were processed.

#### Recommendation.

Continue monitoring determine trends across the Forest and effects to resource specialist time allocations.

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<sup>11</sup> This monitoring item refers to non-recreation special use permits.

## B. Special Use Permit Administration and Inspection

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Special Uses (non-recreation) permit administration and inspection	Land use reports annually on permits scheduled for inspection. Reporting as scheduled in fiscal year action plan.	M/M	Deviation from R-4 standards

### Methods.

Special Uses (non-recreation) permit administration and inspection completed in 2011.

### Variation.

Deviation from Regional (R-4) standards.

### Results.

Non-recreation special use administration and inspection was implemented in 2011 on 177 permits. Region 4 standards were met.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** None.

### Monitoring Resources Available.

Resources have been limited to accomplish this monitoring.

### Recommendation.

Continue monitoring.

## C. Land Survey

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Land Survey	Annual management attainment report. Reporting as scheduled in fiscal year action plan.	H/H	± 10% of planning period target

### Methods.

Surveying has been zoned to the Regional Office Team and is no longer accomplished through the Dixie National Forest.

### Variation.

Plus or minus 10% of planning period target.

### Results.

Regional staff manages land survey.

### Interpretation.

**Is further evaluation needed?** No. Accomplishment was within targets for surveying.

**What are the implications?** None.

**Conclusion.** No variation causing further evaluation and/or change in management direction has been identified.

### Monitoring Resources Available.

Resources have been available for target accomplishment and monitoring.

### Recommendation.

Review this monitoring for possible Forest Plan amendment because the responsibility for this resource is no longer on the Forest.

## D. Land Exchange

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Land Exchange	Land adjustment plan, management attainment report annually on all acres planned for exchange. Reporting as scheduled in fiscal year action plan.	H/H	± 50% of planning period target

### Methods.

Land exchange activities monitored.



**Variation.**

Plus or minus 50% of planning period target.

**Results.**

No land exchanges occurred in 2011. The responsibility, funding, and priorities for land exchanges no longer reside on the Dixie National Forest. This resource has been zoned to Regional Office teams.

**Interpretation.**

**Is further evaluation needed?** No. The Forest did not accomplish land exchanges as expected in the Forest Plan.

**What are the implications?** Over time, case processing for a land exchange has increased from approximately 1-3 years to 4-5 years, which has affected the Forest's ability to meet Forest Plan expectations.

**Conclusion.** The projected target in the Forest Plan is no longer accurate.

**Resources Available.**

The Forest has no resources available to accomplish this monitoring – funding is held in the Regional Office for this resource.

**Recommendation.**

Use a Forest Plan Amendment to drop this monitoring.

**E. Rights-of-Way**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Rights-of-Way	Right-of-way acquisition plan annually on assigned targets. Reporting as scheduled in fiscal year action plan.	H/H	± 50% of planning period target

**Methods.**

Annual right-of-way acquisitions.

**Variation.**

Plus or minus 50% of planning period target.

**Results.**

The responsibility, funding, and priorities for rights-of-way no longer reside on the Dixie National Forest. This resource has been zoned to Regional Office teams.

**Interpretation.**

**Is further evaluation needed?** No. Rights-of-way targets were met to the best of the Forests abilities.

**What are the implications?** This monitoring, accomplishment, and priorities are determined by the Regional Office.

**Conclusion.** The targets and monitoring are no longer a responsibility of the Forest since this resource has been zoned.

**Monitoring Resources Available.**

The Forest has no resources available to accomplish this monitoring – funding is held in the Regional Office for this resource.

**Recommendation.**

Drop this monitoring with a Forest Plan amendment.

## **F. Through Utility Construction**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Construction of Through Utilities	Construction within approved corridors/windows; monitoring and reporting every 5 years.	H/H	Environmental analysis determines that a proposed corridor/window is better suited than those approved in the Forest Plan

**Methods.**

Implementation activity relating to the construction of through utilities.

**Variation.**

Environmental analysis determines that a proposed corridor/window is better suited than those approved in the Forest Plan.

**Results.**

The Utah-Nevada (UNEV) refined petroleum products pipeline construction was implemented on the Forest in 2011; it is within a corridor established by the Forest Plan.

**Interpretation.**

**Is further evaluation needed?** No.

**What are the implications?** Corridors appear to remain appropriate. This monitoring item is out of date and not needed. Utility corridors must be designated in the Forest Plan, they cannot be designated with and EA or EIS.

**Conclusion.** No variance has been identified to change management direction.

**Monitoring Resources Available.**

Monitoring resources have been available for this item.

**Recommendation.**

Consider a Forest Plan amendment to drop this monitoring item.

## SECTION 15. FACILITIES

### A. Road and Bridge Construction/Reconstruction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Road and bridge construction and reconstruction	Annual accomplishment report; report every five-years.	H/H	5% deviation from projected quantities

#### Methods.

Road and bridge construction projects are accomplished through Forest Service labor or formal contracts. Engineering personnel monitor each project for contract compliance as the project is accomplished. Accomplishments are recorded in an annual roads accomplishment report.

#### Variation.

5% deviation from projected quantities. Table IV-2 in the Forest Plan projects 35 miles of local roads constructed or reconstructed in 2011. Permanent road construction is relatively rare on the Forest. Due to funding restrictions, less than ten miles of roads are generally reconstructed annually, although the number fluctuates based on the award of special project funding.

#### Results.

The following roads were reconstructed or rerouted in 2011:

1. Pine Valley South Road – FSR# 30425
2. Reed's Valley – FSR# 30196
3. John L Flat – FSR# 31686

The following bridges and major culverts were reconstructed in 2011:

1. Bear Creek Culvert
2. Bowery Creek Bridge

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** Road reconstruction projections should be updated to match work that can be completed with anticipated funding levels.

**Conclusion.** The Forest annually constructs bridges for aquatic organism passage and reconstructs roads and bridges when special project funding is available, but at lower levels than are projected in the Forest Plan.

### Monitoring Resources Available.

Monitoring resources are needed to inspect roads and bridges to identify health and safety issues and prioritize reconstruction projects.

### Recommendation.

Adjust Forest Plan road reconstruction projections, continue monitoring.

## B. Road Management

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Road Management	Continuous road logs condition surveys, and signs; report every five years.	M/M	5% downward trend in the condition of existing roads

### Methods.

The Washington Office annually determines road condition surveys to be performed on the Forest according to a random sample. Over the past few years, the Dixie has been assigned roughly 2-3 road surveys per year.

Road bridges are inspected on a bi-annual basis. Concrete bridges are inspected by the Regional structural engineer; timber bridges are inspected by certified inspectors on the Forest.

The Forest sign crew annually identifies signs in need of repair or replacement.

### Variation.

A 5% downward trend in the condition of existing roads.

### Results.

The number of roads surveyed annually is too low to determine the trend in the condition of existing roads. Forty-two bridges were inspected in 2011. Many bridges on the Forest were constructed between 40 and 50 years ago. They are reaching the end of their design life. The Forest sign crew is actively installing and replacing signs throughout the Forest.

### Interpretation.

**Is further evaluation needed?** Yes.

**What are the implications?** There is insufficient data to determine the overall trend in the condition of existing roads. Many bridges are near the end of their usable life. If they are not repaired, Forest access will be restricted.

**Conclusion.** There is insufficient data to determine whether the overall condition of the Forest road system is improving or deteriorating. Bridges are being constructed and replaced on the Forest, but these activities are generally in response to flood damage or an aquatic

organism passage barrier. The numbers of bridges reaching their design life is higher than the number being replaced on heavily-used Forest roads. Signage on Forest roads is improving as the sign crew is installing and repairing signs faster than they deteriorate.

### **Monitoring Resources Available.**

There are insufficient resources to conduct road condition surveys as required by the Forest Plan.

### **Recommendation.**

Pursue funds to increase condition survey frequency. Continue to monitor the condition of bridges and pursue funding for replacement and reconstruction.

## **C. Buildings**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Buildings	Annual Inspection reports. 5-year reporting.	M/M	Excessive deterioration of existing buildings

### **Methods.**

Inspection reports. Forest buildings have been inspected on an “as needed” basis prior to 2000. After 2000, buildings have been inspected as required for “Infra” (Infrastructure) reporting (at a rate of 20% per year). Nearly 100% of all buildings have been inspected in the 2005-2010 period. Only a few isolated insignificant structures have not been inspected. Inspections will continue on a rotation basis of 20% per year. Inspections have been used to prioritize spending for maintenance and upgrading of the facilities. However, funds have been insufficient to decrease the backlog of deferred maintenance.

Safety inspections have been performed on the buildings on an as-needed basis. The safety inspections have been used to prepare lists of critical work required on the buildings. Higher priority has been given to accomplishing critical safety repairs and modifications to the buildings.

### **Variation.**

Excessive deterioration of existing buildings.

### **Results.**

Major safety items are being corrected, but some buildings are deteriorating due to lack of funding. The Forest buildings are being maintained as available funding permits. The Facilities Master Plan (FMP) prepared in 2011 has identified buildings excess to Forest needs to decommission or to find alternative uses. The FMP is used to prioritize work and associated funds for work.

## **Interpretation.**

**Is further evaluation needed?** Yes. The FMP identifies the use of each building on the Forest. Due to lack of funds, many buildings have been allowed to deteriorate without maintenance.

**What are the implications?** Buildings will continue to deteriorate unless the deferred maintenance backlog is reduced.

**Conclusion.** A variation causing further evaluation and/or change in management direction has been identified.

## **Monitoring Resources Available.**

Building Inspections are performed by the Forest on schedule.

## **Recommendation.**

Continue the inspection process. Implement Facilities Master Plan (FMP), with emphasis on disposal of buildings identified in the FMP for decommissioning. Identify alternative funding sources for buildings identified in FMP for alternative uses. Decommission buildings identified in FMP for alternative use if proper use and adequate alternative funding cannot be identified. Continue safety inspections to identify critical maintenance items to prioritize allocation of funding.

## **D. Dam Administration**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Dam Administration	Annual Inspections and reporting.	H/H	Administrative failure to follow-up on unsafe dams

## **Methods.**

The dams located on the Forest, including those owned by the Forest Service and those owned by others, are inspected according to the hazard class. High-hazard dams are inspected annually, moderate-hazard dams biannually, and low-hazard dams every five years. Most dams have been inspected according to the schedule with the results being that many have been reconstructed and upgraded to bring them up to State and Federal standards. High hazard dams are inspected by the State, with coordination from the Forest.

## **Variation.**

Administrative failure to follow-up on unsafe dams.

## **Results.**

The Forest dam program has been active in reconstructing and upgrading permitted dams. Beaver Dam, Fish Creek, Upper Barker, Lower Barker, Joe Lay, Upper Enterprise, and Calf Springs Creek dams have been reconstructed during the monitoring period to bring them up to current standards. Kings Creek and Lower Enterprise dams have been core drilled to evaluate

structural adequacy. Remote telemetry devices have been installed on Lower Bowns and Spectacle Reservoir dams. A new outlet pipe was installed on Spectacle, a new hydraulic gate was installed on Lower Enterprise, and a new outlet gate was installed at Panguitch Lake.

Forest-owned dams (Pine Valley, Flat, Robs, and Pine Creek) continue to be under-funded, and in need of heavy maintenance and/or reconstruction. The Navajo Lake Dam is operated under a shared maintenance agreement between the Forest Service and the State of Utah. It failed twice during the monitoring period. The second breach has not yet been repaired.

#### **Interpretation.**

**Is further evaluation needed?** Yes.

**What are the implications?** Dams that are in need of heavy maintenance and/or reconstruction will continue to deteriorate, increasing the safety hazards.

**Conclusion.** A variation causing further evaluation and/or change in management direction has been identified.

#### **Monitoring Resources Available.**

There are insufficient monitoring resources available to perform the required inspections.

#### **Recommendation.**

Continue the annual inspection of the dams according to the dam hazard classifications. The Forest Engineer will coordinate with the State Agency when they are making the inspections. Ask the Forest Leadership Team for direction on funding the inspection workload.

### **E. Drinking Water Regulation Compliance<sup>12</sup>**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Utah Public Drinking Water Regulations	Required chemical analyses and reporting every 3 years	H/H	Violation of primary maximum contaminant levels

#### **Methods.**

In conjunction with the State of Utah, 100% of all water systems have been surveyed in 2005-2010 period. Inspections will continue on a rotation basis of 20% per year or as recommended by the State of Utah. Inspections have been used to prioritize spending for maintenance and upgrading of the facilities. However, funds have been insufficient to decrease the backlog of deferred maintenance.

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<sup>12</sup> This monitoring item is listed under “Water” in the Forest Plan. It is moved to be under the Facilities heading because it involves maintaining safe drinking water with our facilities rather than water quality of surface water.

**Variation.**

Violation of maximum contaminant levels. Tests performed are: Nitrate and Sulfate contaminant testing and monthly sampling for bacteria.

**Results.**

All water systems have been tested according to requirements. All systems meet standards for nitrate and sulfate. Monthly sampling for bacteria results in occasional positive results. Follow-up samples are collected as per State and Federal regulations.

**Interpretation.**

**Is further evaluation needed?** Yes. Bacteria limits are occasionally exceeded in some systems. Routine testing for bacteria is performed as an indicator of operational problems. Some positive samples can be expected in most systems.

**What are the implications?** Occasional positive bacterial samples can indicate system operational problems requiring corrections, such as leaks. Routine sampling indicates the presence of problems, allowing for correction.

**Conclusion.** All Forest drinking water systems produce water with contaminant levels below State and Federal standards. No pattern of excessive bacteriological contamination is apparent in the Forest drinking water systems. Continue routine monitoring in accordance with State regulations to insure proper system operation.

**Monitoring Resources Available.**

Monitoring resources include Forest Facility Engineer to coordinate program, and District and Concessionaire water system operators to conduct sampling.

**Recommendation.**

Change the monitoring methods and frequency to comply with State and Federal requirements with a Forest Plan Amendment. The variation that would cause further evaluation and/or change in management direction should also be changed with a Forest Plan amendment to read, "Results of water testing causes State to issue a 'Not Approved' status for a water system". Continue monitoring program in accordance with State and Federal standards. Comply with Maximum Contaminant Levels set by Federal standards.



## SECTION 16. PROTECTION – FIRE

### A. Fire Prevention Programs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Adequacy of fire prevention programs	Measure of number and size of person-caused fires annually; report every five years.	H/H	20% increase in cumulative 5-year average

#### Methods.

Fire prevention officers are employed by the Dixie National Forest and work with cooperating agencies (BLM, Park Service, State). They engage in a variety of activities including public education, signing, patrolling, and enforcing fire restrictions. Funding for these positions are included in the preparedness budget.

#### Variation.

20% increase (of number and size of person-caused fires annually) in cumulative five-year average.

#### Results.

We measure the adequacy of our prevention programs by the number of human-caused fires. As shown in the table below, there were ten human-caused fires with a total of 67 acres burned in 2011. The number of human-caused fires is slightly lower than the five-year average of 13 fires, and acreage burned is significantly below the five-year average of 748 acres. Initial attack on human-caused fires was very effective.

**Table 17. Summary of number and acres of human-caused and lightning-caused fires in 2011.**

Type of Fire	Ignitions	Acreage
Wildfires-lightning	35	321
Human-caused	10	67
Total	45	388

#### Interpretation.

**Is further evaluation needed?** No. The number of human caused fires in 2011 was lower than previous averages.

**What are the implications?** Prevention efforts have been successful in decreasing the number of human-caused fire starts on the Dixie National Forest.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified.

**Monitoring Resources Available.**

Monitoring resources have been allocated for this monitoring.

**Recommendation.**

Continue the fire prevention program and monitoring.

**B. Wildfires**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Number of wildfires and acres burned	Frequency by size distribution, intensity level, and acres burned annually; report every five years.	H/H	20% increase in cumulative 5-year average for any of the factors

**Methods.**

Number of wildfires and acres burned.

**Variation.**

A 20% increase in cumulative five-year average for any of the factors (size distribution, intensity level, and acres burned).

**Results.**

In 2011, a total of 388 Dixie National Forest acres were burned, well below the five-year average of 5,464 acres. There were 45 wildfires on the Forest, with the acreage distributed across all Districts.

The Escalante Ranger District of the Dixie National Forest had the largest fire of the season. The Toddler fire started from lightning on August 22nd and grew to 185 acres, all on Dixie National Forest lands. The next largest fire on the Forest was the lightning-caused School Wash Fire at 126 acres on the Cedar City Ranger District.

**Interpretation.**

**Is further evaluation needed?** No.

**What are the implications?** The number of fires and acres burned each year fluctuates due to a variety of factors including the number of ignitions and drought.

**Conclusion.** Continue to monitor trends in number and acres of wildfires.

**Monitoring Resources Available.**

Monitoring resources have been allocated.

**Recommendation.**

Continue monitoring.

## C. Fire Management Effectiveness Index

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fire management Effectiveness Index (FMEI)	Evaluate cost plus net value change during fire annually; report every five years.	M/M	20% increase in FMEI (FFP+FFF+NVC)

### Methods.

The FMEI is not part of NFMAS (National Fire Management Analysis System). It is made up of some of the same components that are used in NFMAS, which is currently used to measure the efficiency of the planned program against historical fire occurrence. Measurements for current years with this method are not possible.

### Variation.

20% increase in FMEI (FFP+FFF+NVC).

### Results.

We no longer use this reporting method because it does not adequately measure success of the fire program. As a surrogate for this obsolete metric, initial action effectiveness is calculated. Of the 45 fires in 2011, only 1 escaped initial action efforts. This equates to a 98% initial action success rate for this year. This high success rate also means that suppression expenditures were minimized. Typically, higher suppression costs are attributable to larger fires.

### Interpretation.

**Is further evaluation needed?** Yes, due to recent changes in fire management planning and emphasis placed on the fire management program from Congress and others, the preparedness budget (FFP in the formula) has risen to a point where it exceeds the previous five-year periods' budgets by 20%. Suppression costs (FFF in the formula) have also risen due to increased use of aircraft and contract resources in recent years that also exceed previous time period expenditures by 20% or more.

**What are the implications?** There is the appearance that the Forest Plan standard is not being met due to changes in the fire program and in measurement criteria in recent years (post-2000).

**Conclusion.** There needs to be a new measure determined and implemented through a Forest Plan amendment. Monitoring of the cost-effectiveness of the fire management program is difficult due to wide fluctuations from year to year based on the number of fires, seasonal weather, and appropriated budget fluctuations. The items listed in the formula above are essentially those things used under the NFMAS system but in a slightly different arrangement to measure the efficiency of various fire program options. This system is being replaced by a new interagency planning system that does not use cost as the measure of efficiency, but rather uses cost and measurable program objectives as the measure of efficiency.

### **Monitoring Resources Available.**

On the Dixie National Forest, suppression resources and staffing level is determined by the NFMAS process and funded at the appropriate MEL level. Monitoring resources are currently available.

### **Recommendation.**

A Forest Plan amendment is needed for this monitoring item. To measure the efficiency of the fire program by using number of human starts to measure prevention program efficiency or number of fires that escape initial attack to measure initial attack efficiency may be better than current measurements stated in the Forest Plan.

## **D. Fuel Loading Standard Compliance**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with fuel loading standards	Field measurements after activity or field treatment; sample 30% of projects; report every five years.	M/M	Exceeding fuel level guidelines or 10% failure to make targets

### **Methods.**

Acres of prescribed fire, wildfire, and mechanical treatments to reduce fuel loading.

### **Variation.**

Exceeding fuel level guidelines or 10% failure to make targets.

### **Results.**

The Dixie National Forest used prescribed burns, wildfires, and mechanical treatments to reduce fuel loading. Fuel treatment effectiveness was monitored across the Forest by establishing and re-measuring sampling locations for both fuels treatments and wildfires. This involved data gathered from more than 400 plots across the Forest. In 2011, the Forest fuels program completed 10,444 acres of treatments. This included 3,217 acres of prescribed fire treatments, 2,681 acres of mechanical treatments, 311 acres of wildfire managed for resource benefit, and 4,235 acres awarded under contract.

### **Interpretation.**

**Is further evaluation needed?** No, fuels were treated at target levels.

**What are the implications?** None.

**Conclusion.** Continue to monitor and focus on effectiveness of fuel reduction.

### **Monitoring Resources Available.**

Pre- and post-treatment monitoring is not occurring on a regular basis. No standard for effectiveness monitoring has been established.

**Recommendation.**

Continue monitoring.

## SECTION 17. PROTECTION – INSECTS AND DISEASES

### A. Insect and Disease Populations

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Population levels of insects and diseases	Annual aerial surveys by R-4 F.P.M.; annual reporting.	M/M	Building of past [pest] populations

#### Methods.

Annual aerial surveys, conducted by the Region's Forest and Pest Management section, have shown that insect activities have been sporadic over the 1987-2011 period. FPM personnel have completed numerous project level insect and disease evaluations during this period. A date visualization project has also been initiated in cooperation with Forest Pest Management which is designed to blend stand data, growth and yield projections, and site photography together in a simulation model to display pest infestation effects over time.

#### Variation.

Building of past [pest] populations.

#### Results.

Localized mountain (*Dendroctonus ponderosae*) and western (*Dendroctonus brevicomis*) pine beetle buildups have been observed over the years, as the sustained drought conditions create greater moisture stress and stand susceptibility, particularly in the older trees. Approximately 2,000 mountain pine beetle-infested trees were treated in the Panguitch Lake campground in an attempt to retain the important tree cover at that site. In 2002, the campground was non-commercially thinned to reduce tree densities and subsequent risk of bark beetle infestation.

The mountain pine bark beetle, along with limb rust and mistletoe, are slowly killing the over-mature ponderosa pine on the Forest.

A spruce bark beetle (*Dendroctonus rufipennis*) population grew to epidemic levels on the Cedar City District in the early 1990s. The beetle outbreak spread across the Markagunt Plateau, essentially killing all of the over-mature/mature and intermediate Engelmann spruce trees over thousands of acres. By 2002, the Engelmann spruce component on the Cedar City District has been altered from an over-mature stand structure to total stand replacement in some areas and small seedling/saplings in others. Over the next century, the spruce-dominated landscape will revegetate to seral aspen stand structure.

In the mid to late 1990s, the spruce beetle population grew to epidemic levels on Mount Dutton on the Powell Ranger District. Here, too, the mature/over-mature spruce stands have been replaced with aspen and subalpine fir because of the Engelmann spruce mortality.

Since the early 2000s, spruce beetles have been active on the Escalante and Teasdale Ranger Districts. Aerial Detection Surveys from 2003 to 2007 had estimated more than 100,000

Engelmann spruce trees have been killed by spruce beetle on the Escalante Ranger District. These epidemic outbreaks resulted in replacement of mature/over-mature spruce stands with a composition of aspen, subalpine fir, and small diameter sized Engelmann spruce. Spruce beetle populations continue to be observed, including annual beetle trap monitoring on the Griffin Top of the Escalante District.

Recently, the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and fir engraver beetle (*Scolytus ventralis*) populations have been building, and killing large areas of Douglas-fir and sub-alpine fir trees. The pinyon “ips” beetle population has reached epidemic levels in some areas in the pinyon/juniper type and has killed vast areas of pinyon pine.

Root rot continues to be widespread. A research/treatment program has been initiated in the Peterson Grove area on the Teasdale District, and localized treatments have been prescribed in timber sale projects. Results of the research and treatments are pending. Timber sale prescriptions and cultural treatment activities appear to have reduced the incidence of limb rust in ponderosa pine.

### **Interpretation.**

**Is further evaluation needed?** Yes.

**What are the implications?** While spruce beetle infestations have slowed, it is important to continue monitoring their activity in areas that haven’t experienced an epidemic. While much of the Cedar City RD has undergone a spruce beetle epidemic, the Escalante RD has not had such widespread epidemics but are at high susceptibility of future infestations. Other insects and disease have increased over the past ten years such as Douglas fir beetle and dwarf mistletoe. These increases have prompted more salvage and delayed other treatment activities such as improving growth in stands of green trees.

**Conclusion.** A variation causing further evaluation and/or change in management direction has been identified.

### **Monitoring Resources Available.**

Annual aerial surveys, conducted by the Region’s Forest and Pest Management completes this monitoring.

### **Recommendation.**

Continue annual aerial surveys, and other FPM field work.

Review this monitoring item for possible Forest Plan amendment for feasibility in light of recent large-scale bark beetle infestations. Change “past” populations to “pest” populations.

## B. Dwarf Mistletoe Suppression

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness of dwarf mistletoe suppression projects to protect regeneration	Field reviews, follow-up on projects; five-year reporting frequency.	H/H	Infestation in regeneration of pre-commercial thinned areas

### Methods.

Pre-treatment surveys, follow-up surveys are completed to monitor dwarf mistletoe activity and reported in activity databases.

### Variation.

Infestation of dwarf mistletoe in regeneration of pre-commercially thinned areas.

### Results.

Dwarf mistletoe treatments have been prescribed in all affected timber sale project areas initiated during this period, and thousands of acres within individual control projects have been completed. Permanent growth plots have also been established to monitor the long-term effects of mistletoe on tree growth.

Treatment prescriptions and projects have been successful in reducing localized infestation of dwarf mistletoe. However, the disease continues to be widespread in many stands, requiring continued emphasis on treatment and management.

### Interpretation.

**Is further evaluation needed?** Yes.

**What are the implications?** The variation causing further evaluation, “Infestation in regeneration of pre-commercial thinned areas” implies any infestation, which may not be feasible.

**Conclusion.** A variation which would cause further evaluation and/or change in management direction has been identified.

### Monitoring Resources Available.

Resources have been available for the Forest to monitor thinned and reforested areas for mistletoe infestation.

### Recommendation.

Continue the cooperative work with FPM to properly implement and monitor dwarf mistletoe management projects. Consider a Forest Plan amendment for the variance to be in a more feasible range.



## SECTION 18. AIR QUALITY

### A. Air Quality Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Utah State Air Quality Guidelines and Standards	Compliance with weather forecast, burning index, ongoing; report as violations occur.	M/M	Adverse public reaction, settling of smoke into inhabited areas

#### Methods.

All prescribed burning is implemented in compliance with the Utah Interagency Smoke Management Program. The Dixie National Forest submits an Annual Burn Schedule containing all planned prescribed burns for the calendar year by March 15 of that year to the Utah Interagency Smoke Management Coordinator. For burns greater than 20 acres or those that produce more than 0.5 PM T/D (particulate matter in tons per day), pre-burn information including the burn plan with day/night smoke flow maps to address sensitive receptors and smoke mitigation measures, must be submitted to the smoke coordinator. Permission to burn is given on a daily basis by the Utah Interagency Smoke Management Coordinator.

#### Variation.

Adverse public reaction, settling of smoke into inhabited areas.

#### Results.

All prescribed burning was implemented in compliance with the Utah Interagency Smoke Management Program. The Forest submitted the annual burn schedule to the Utah Interagency Smoke Management Coordinator as required. Permission to emit smoke was given before each prescribed burn was ignited. In 2011, Dixie National Forest fire managers complied with State Air Quality Standards, with no violations for significantly contributing to particulate matter. Public complaints were monitored by local Ranger Districts and reported to the Utah Interagency Smoke Management Coordinator. There were fewer than five public comments about smoke concerns for all prescribed fires on the Forest.

#### Interpretation.

**Is further evaluation needed?** Yes, air quality violations did not occur; however, adverse public reactions did occur.

**What are the implications?** Plans for burning need to respond to the public's concerns about smoke in their communities.

**Conclusion.** Variation causing further evaluation and/or change in management direction did occur.

**Monitoring Resources Available.**

Air quality monitoring in association with prescribed burning is implemented in compliance with the Utah Interagency Smoke Management Program by the District and Forest Fire Management Officers.

**Recommendation.**

Continue Monitoring. Review this monitoring item in light of likely increased fuels treatment as directed by the National Fire Plan for possible Forest Plan amendment. The variation that would cause further evaluation and/or change in management direction, “Adverse public reaction, settling of smoke into inhabited areas” may no longer be appropriate.

**Citations**

Utah Interagency Smoke Management Program

## SECTION 19. ECONOMICS

### A. Local Economics

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effects on local economies of Forest outputs	District staff reviews and reports of affected sectors annually	[No precision specified in the Forest Plan]	Significant changes in sectors within economic impact areas

#### **Methods.**

District staff reviews and reports of affected sectors annually.

#### **Variation.**

Significant changes in sectors within economic impact areas

#### **Results.**

Insufficient data were presented.

#### **Interpretation.**

**Is further evaluation needed?** Unknown.

**What are the implications?** Unknown

**Conclusion.** Insufficient data were presented.

#### **Monitoring Resources Available.**

Insufficient data were presented.

#### **Recommendation.**

Remove this monitoring item.

## SECTION 20. RESULTS AND RECOMMENDATIONS

### Monitoring Results

There are 85 monitoring items listed in the Forest Plan, including 7 monitoring items added with the Northern Goshawk Amendment. Three of the monitoring items in the goshawk amendment monitor essentially the same resource as three in the Forest Plan and are referenced to each other for results in this document. The items in both the amendment and the Forest Plan are: northern goshawk territory occupancy; snag habitat; and forage (grazing) utilization. Results of the monitoring reported for the fiscal year 2011 period are summarized on Table 18.

Of the 85 total monitoring items in the monitoring identified in the Plan and amendments, 57 (67%) have been accomplished sufficiently to report results (see Figure 17). Of these, 21 (25%) indicate a variation causing further evaluation and/or change in management direction. Thirty-five monitoring items are recommended for a Forest Plan amendment regardless of whether there is a variation causing further evaluation or not. Thirteen monitoring items are recommended for dropping or combining, thirteen for rewording, and fifteen to change the monitoring method or frequency of monitoring. The remaining items recommended for Forest Plan amendment involve more complex changes.

There are 11 monitoring items causing further evaluation and/or change that are not recommended for a Forest Plan amendment. This indicates that the analysis may be more appropriate focusing on the resource conditions and/or management direction and not with the monitoring item itself. There are 10 items that recommended for amendment and further evaluation.

**Figure 17. Percentages of Forest Plan monitoring items with results (Results), those with variation causing further evaluation and/or change in management direction (Further Eval), items for which a Forest Plan amendment is recommended (Amend), items recommended to drop (Drop), change wording (Wording), and change the method of measure and/or monitoring frequency (Methods).**

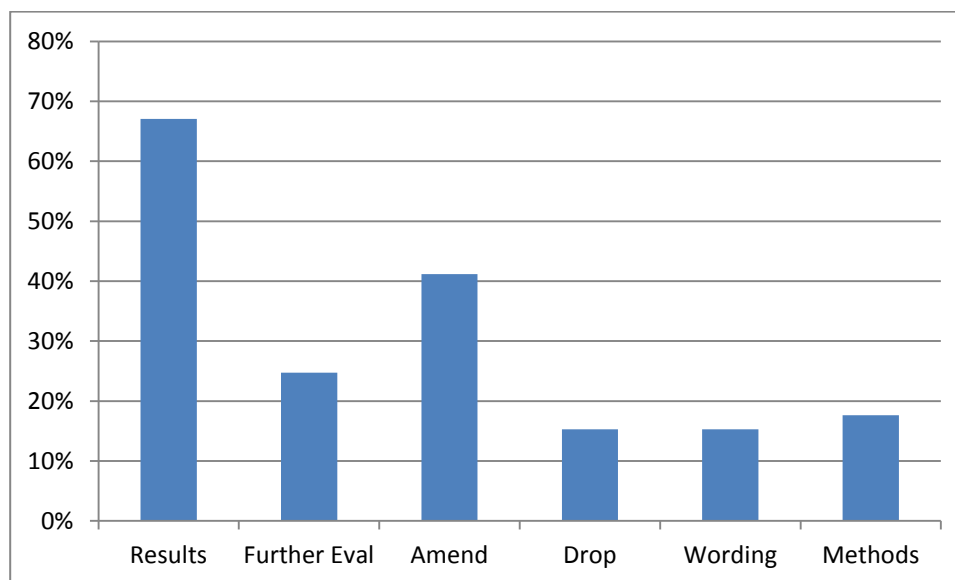


Table 18 lists monitoring priorities carried forward from the 1982 Monitoring and Evaluation Report. The items from the Utah Northern Goshawk Project Amendment did not have priorities assigned. Monitoring priorities in the 1992 report were defined as:

*“Priority 1 – This monitoring is mandatory because the information provided is either required by law, regulations, contractual obligations, agency policy or mandatory reporting, or its value is essential to successful accomplishment of the Forest’s mission, goals and objectives. Project implementation is conditional on this monitoring being accomplished.*

*Priority 2 – This monitoring is important, but not mandatory. It should be done but will depend on availability of funds and personnel. The monitoring is not essential to complying with laws, regulations, contractual obligations, agency policy or mandatory reporting, or its absence will not deter successful accomplishment of the Forest’s mission, goals, or objectives. Accomplishment would be achieved at a higher level of quality if this monitoring were don’t. Project implementation may continue if this monitoring cannot be accomplished.*

*Priority 3 – This monitoring is less important, and optional. It provides useful information that would benefit forest managers. Again, the information provided is not essential to complying with laws, regulations or other firm obligations, and its absence will not deter successful accomplishment of the Forest’s mission, goals, or objectives. Project implementation may continue if this monitoring cannot be accomplished.*

*N/A (Not Applicable) – is displayed where the recommendation was made to eliminate a specific monitoring requirement.”*

**Table 18. Summary of results from the Dixie National Forest Ten-year Monitoring Plan. Priorities are those brought forward from the 1992 monitoring report. NI = priority not indicated.**

<b>Activities, Effects, and Resources Measured</b>	<b>Priority</b>	<b>Variation for Further Evaluation</b>	<b>Need for a Forest Plan Amendment</b>
<b>DEVELOPED RECREATION – PUBLIC</b>			
<u>A. Condition of Facilities</u> (whether the condition of developed facilities is declining from the current situation); Page IV-1, Objective, Goal 1.	2	Unknown	Yes – wording, methods
<u>B. Soil and Vegetative Loss at Developed Sites</u> ; Page IV-1, Objective, Goal 1	2	Unknown	Yes – wording, methods
<u>C. Facility Capacity</u> (whether construction and reconstruction of facilities is keeping pace with demand); Page IV-1, Objective, Goal 1.	2	Unknown	Yes – wording, methods
<u>D. Developed Site Service</u> (whether Forest is able to provide service scheduled in the plan); Page IV-2, Direction, Goal 1.	2	Unknown	Yes – wording, methods

<b>Activities, Effects, and Resources Measured</b>	<b>Priority</b>	<b>Variation for Further Evaluation</b>	<b>Need for a Forest Plan Amendment</b>
<u>E. Developed Site Use</u> – Amount & Distribution (does demand exceed supply?); Page IV-1, Objective, Goal 1.	2	Yes	Yes – wording, methods
<b>DEVELOPED RECREATION – PRIVATE</b>			
<u>A. Downhill Ski Area Use</u> (is it increasing as projected?); Page IV-2 Objective, Goal 2.	2	Yes	Yes – drop
<u>B. Organization Site Use</u> (are existing sites being fully utilized?)	2	No	Yes – drop
<b>DISPERSED RECREATION</b>			
<u>A. Dispersed Visitor Use</u> (summer and winter); Page IV-2, Objective, Goal 3; Page IV-3, Objective, Goal 5.	2	Unknown	Yes – methods
<u>B. Site Condition</u> (Limits of change); Page IV-3, Objective, Goal 8.	2	Yes	Yes - methods
<u>C. Trail Condition</u> ; Page IV-3, Objective, Goal 5.	2	In progress	No
<u>D. Shifts between ROS Classes</u>	2	In progress	No
<b>WILDERNESS</b>			
<u>A. Condition of Campsites and Surrounding area</u> (are conditions declining from the current situation?)	2	No	Yes – methods
<u>B. Amount and distribution of Human Use</u>	2	Unknown	No
<b>CULTURAL RESOURCES</b>			
<u>A. Completion of cultural resource investigation for all site-disturbing projects where no inventory has been completed in the past</u> ; Page IV-4, Objective, Goal 9.	1	No	No
<b>SCENIC RESOURCES</b>			
<u>A. Compliance with Visual Quality Objectives</u>	2	Yes	Yes – methods
<b>WILDLIFE AND FISH</b>			
<b>Management Indicators</b>			
<u>A. Big game (mule deer and elk)</u>	2	No	Yes - drop
<u>B. Wild turkey</u>	2	No	Yes - drop
<u>C. Northern Goshawk</u>	1	No	<u>Yes – drop/combine with “M” below.</u>
<u>D. Northern (common) flicker</u>	2	No	No
<u>E. Native cutthroat trout: Bonneville/Colorado River</u>		No	No
<u>F. Virgin spinedace</u>		No	No
<u>G. Southern leatherside</u>		No	No

<b>Activities, Effects, and Resources Measured</b>	<b>Priority</b>	<b>Variation for Further Evaluation</b>	<b>Need for a Forest Plan Amendment</b>
<u>H. Nonnative trout: brook, brown, rainbow, cutthroat.</u>	2	No	No
<b>Conformance with Standards and Guidelines</b>			
<u>I. Habitat Diversity</u>	1	Unknown	Yes – methods
<u>J. Snag management</u>	1	Unknown	<u>Yes – drop/combine with “P” below.</u>
<u>K. Fish/Riparian habitat</u>	2	No	No
<u>L. Habitat effectiveness for big game species.</u>	2	Unknown	Yes – wording, methods
<b>Utah Northern Goshawk Amendment</b>			
<u>M. Are known goshawk territories on National Forests remaining occupied?</u>	NI <sup>13</sup>	No	<u>No</u>
<u>N. Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?</u>	NI	Insufficient data	No
<u>O. Is habitat connectivity, as represented by structural and species diversity and dispersion thereof, with and among 5<sup>th</sup> to 6<sup>th</sup> order watersheds (or equivalent ecological scale) being maintained?</u>	NI	Insufficient data	No
<u>P. Is snag habitat (i.e., number and size of snags) being maintained in desired spatial arrangement?</u>	NI	Insufficient data	<u>No</u>
<u>Q. Are down woody material and logs being maintained in sufficient amounts, sizes, and spatial locations?</u>	NI	Insufficient data	No
<u>R. Are appropriate adjustments made to grazing practices in identified “at-risk” locations where grazing is contributing to the “at-risk” condition?</u>	NI	Insufficient data	<u>No</u>
<b>RANGE</b>			
<u>A. Range Vegetation Condition and Trend</u>	2	Yes	No
<u>B. Forage Utilization</u>	2	Yes	No
<u>C. Wild Horse Numbers and Habitat Trends</u>	2	Yes	Yes - wording
<b>TIMBER</b>			

<sup>13</sup> Priorities are not identified or assigned in the Forest Plan amendment.

<b>Activities, Effects, and Resources Measured</b>	<b>Priority</b>	<b>Variation for Further Evaluation</b>	<b>Need for a Forest Plan Amendment</b>
<u>A. Timber Harvest Area</u>	2	No	Yes - wording
<u>B. Timber Research Needs existing</u>	3	In Progress	Yes – wording
<u>C. Verify Classification of suitable and Unsuitable Lands</u>	1	In Progress	No
<u>D. Harvest Practices in Retention, Partial Retention, and Riparian areas.</u>	2	Yes	Yes – methods
<u>E. Adequate Restocking of Stands Within a Reasonable time Period, Generally 5 years of Final Harvest.</u>	1	No	No
<u>F. Maximum Size of Openings Created by Clearcuttings</u>	1	No	No
<u>G. Reforestation and Timber Stand Improvement Accomplishment</u>	1	No	No
<u>H. Fuelwood Consumption and Supply</u>	2	No	No
<u>I. Growth Response of Regenerated Stands, Precommercially Thinned Stands and Cutover Sawtimber (including effects of insects &amp; diseases)</u>	3	No	No
<u>J. Timber Supply Projections</u>	2	Yes	Yes - methods
<b>SOILS</b>			
<u>A. Long-Term Soil Productivity</u>	1	Yes	No
<u>B. Soil Compaction</u>	2	No	No
<u>C. Upland Areas Adjacent to Riparian Management Areas</u>	N/A	No	No
<u>D. Soil &amp; Water Resource Protection</u>	1	Yes	No
<u>E. Soil Survey Activities</u>	1	No	No
<u>F. Soil &amp; Water Resource Improvement Needs Inventory</u>	2	No	No
<b>WATER</b>			
<u>A. Compliance with State Water Quality Standards</u>	1	Yes	No
<u>B. Effectiveness of Best Management Practice in Meeting Water Quality Objectives and Goals</u>	1	Yes	No
<u>C. Water Yield Increases in East Fork of Sevier Watershed</u>	N/A	No	Yes – drop
<u>D. Stability of Streambanks in East Fork of Sevier River Drainages</u>	1	No	No
<u>E. Effectiveness and Maintenance Needs of Watershed Improvements</u>	2	Yes	Yes - drop

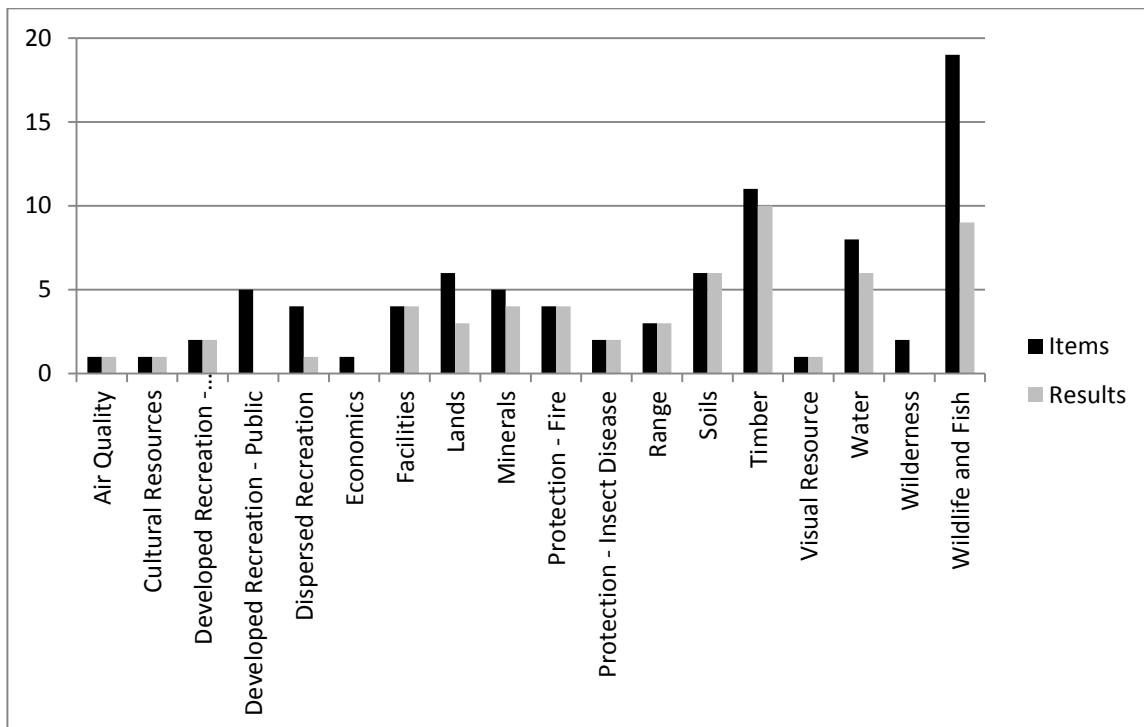


<b>Activities, Effects, and Resources Measured</b>	<b>Priority</b>	<b>Variation for Further Evaluation</b>	<b>Need for a Forest Plan Amendment</b>
<u>F. Accomplishment of Riparian Area Management Goals</u>	1	Yes	No
<b>MINERALS</b>			
<u>A. Exploration Proposals: Adequacy of Permitted Process</u>	2	No	No
<u>B. Lease/Permit Applications Forms and NEPA Process (Compliance with Regional Standards and Direction)</u>	1	No	No.
<u>C. Site Specific Development Proposals and Administration of Operations, Compliance with Terms of Operating Plans and Existing Agreements</u>	1	No	No
<u>D. Reclamation Results: Effectiveness of Work Done</u>	1	No	No
<u>E. Exercise of Reserved and Outstanding Rights by Owner of Minerals</u>	N/A	No	No
<b>LANDS</b>			
<u>A. Special Use Permits, Applications, Amendments and Transfers</u>	1	No	No
<u>B. Special Uses (non recreation) Permit Administration and Inspection</u>	1	No	No
<u>C. Land Survey</u>	1	No	Yes – drop
<u>D. Land Exchange</u>	1	No	Yes – drop
<u>E. Rights-of-Way</u>	2	No	Yes – drop
<u>F. Construction of Through Utilities</u>	2	No	Yes – drop
<b>FACILITIES</b>			
<u>A. Road and Bridge Construction and Reconstruction</u>	1	No	Yes - wording
<u>B. Road Management</u>	2	Yes	No
<u>C. Buildings</u>	1	Yes	No
<u>D. Dam Administration</u>	1	Yes	No
<u>E. Compliance with Utah Public Drinking Water Regulations</u>	1	Yes	Yes - methods
<b>PROTECTION – FIRE</b>			
<u>A. Adequacy of Fire Prevention Programs</u>	2	No	No
<u>B. Number of Wildfires and Acres Burned</u>	2	No	No
<u>C. Fire management Effectiveness Index (FMEI)</u>	1	Yes	Yes – methods
<u>D. Compliance with Fuel Loading Standards</u>	2	No	No
<b>PROTECTION – INSECTS AND DISEASES</b>			

<b>Activities, Effects, and Resources Measured</b>	<b>Priority</b>	<b>Variation for Further Evaluation</b>	<b>Need for a Forest Plan Amendment</b>
<u>A. Population Levels of Insects and Diseases</u>	2	Yes	Yes – wording, methods
<u>B. Effectiveness of Dwarf Mistletoe Suppression Projects to Protect Regeneration</u>	2	Yes	Yes - wording
<b>AIR QUALITY</b>			
<u>A. Compliance with Utah State Air Quality Guidelines and Standards</u>	1	Yes	Yes - wording
<b>ECONOMICS</b>			
<u>A. Effects on Local Economies of Forest Outputs</u>	2	Insufficient data	No

The total number of monitoring items in each resource and the number with sufficient data to come to conclusions are shown on Figure 18. Wildlife and Fish, Timber, and Recreation (Developed, Dispersed and Wilderness) have the largest number of monitoring items in the Plan. Resource categories that reported sufficient data to make determinations on all monitoring items are Air Quality, Cultural Resources, Developed Recreation, Facilities, Protection, and Soils.

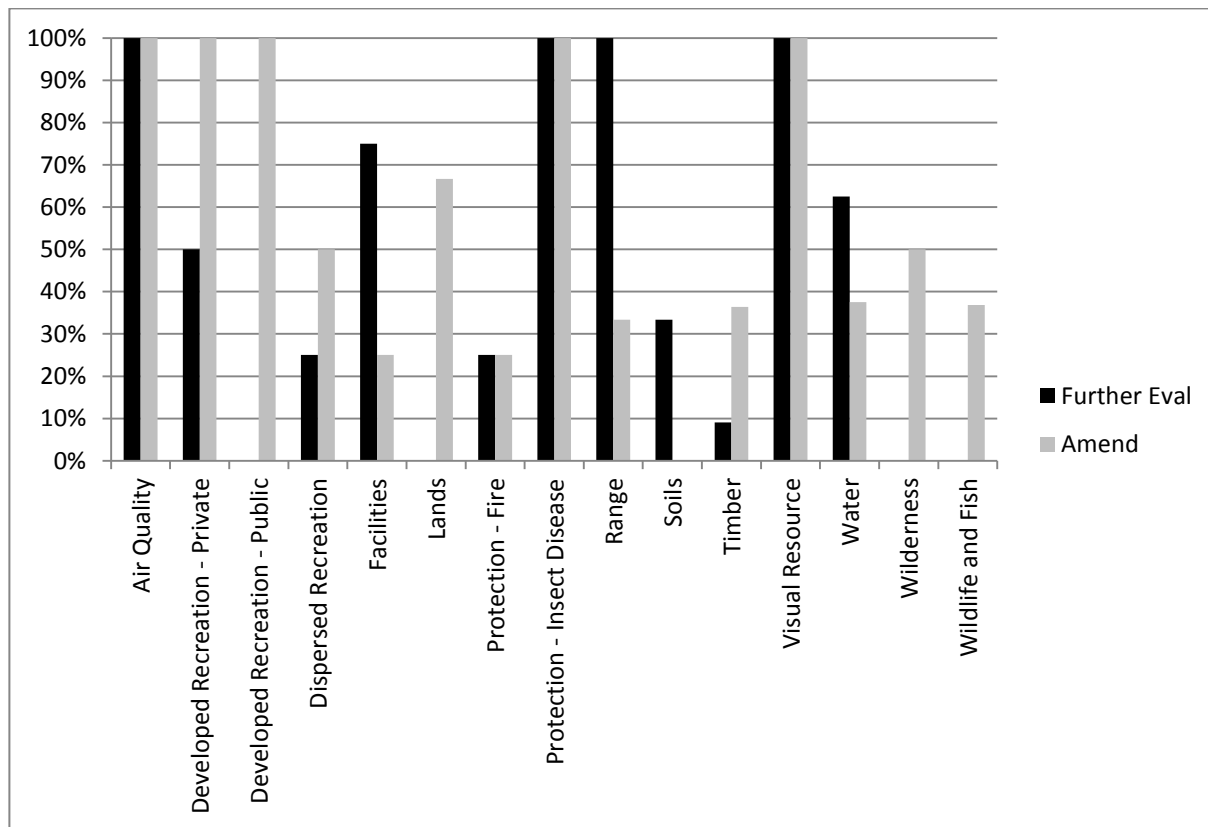
**Figure 18. Number of monitoring items by resource in the Dixie National Forest Land and Resource Management Plan, and those with results sufficient to make determinations.**



As shown on Figure 17, Forest Plan amendments are recommended for at least 40% of all monitoring items. None of the items monitored in lands reflect a variation causing further evaluation, but all of them are recommended for a Forest Plan amendment. All of the monitoring items in Air Quality, Protection – Insect/Disease, and Visual Resources have a variation causing further evaluation and are recommended for a Forest Plan amendment. Amendments are recommended on all Developed Recreation monitoring items.

Six (33%) of the eighteen resource groups have more than half the monitoring items recommended for a Forest Plan amendment. Some resources have few monitoring items, so the percentage appears high (such as Air Quality and Visual Resources).

**Figure 19. Percent of monitoring items by resource on the Dixie National Forest indicating the need for further analysis and/or a change in management direction, and recommended for Forest Plan amendment. (Percent of items indicating a need for further analysis is of those with sufficient data to make that determination, and percent recommended for amendment is of all monitoring items.)**



Appendix B of the Forest Plan itemizes a schedule of projects by District and year from 1986 through 1996. Many of the projects listed were not accomplished due to lack of funding. The methods to reach goals and objectives has changed from 1986, therefore, some of the scheduled projects are no longer valid.